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Volume XLII

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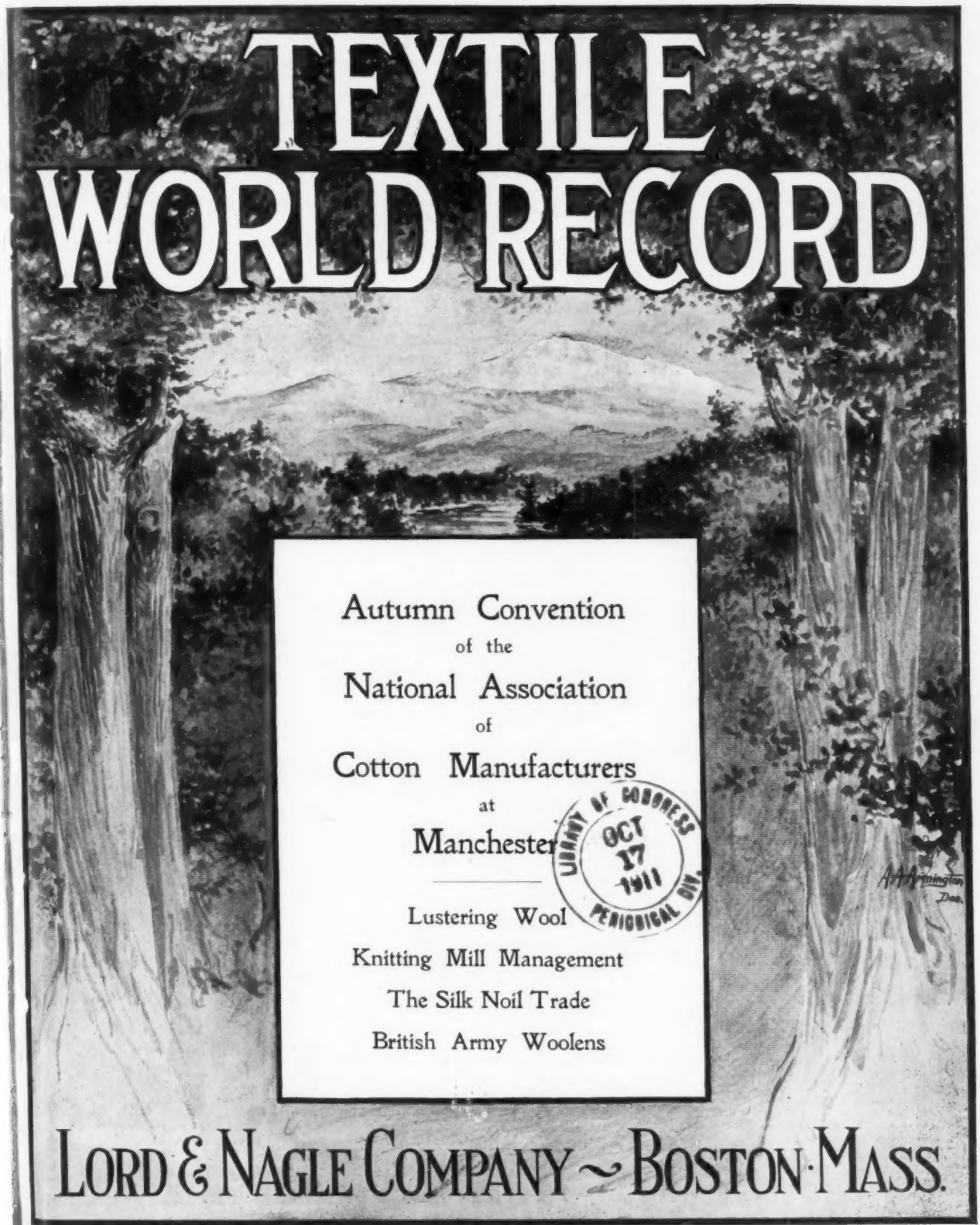
OCTOBER, 1911

$2.00 per year
$3.00 with Directory

TEXTILE WORLD RECORD



Autumn Convention
of the
National Association
of
Cotton Manufacturers
at
Manchester

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OCT 17 1911
PERIODICAL DIV.

Lustering Wool
Knitting Mill Management
The Silk Noil Trade
British Army Woolens

LORD & NAGLE COMPANY ~ BOSTON · MASS.

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TS1300
.T36

The TEXTILE-FINISHING MACHINERY CO.

Howard Building, Providence, R. I.

BUILDERS OF

Bleaching, Mercerizing, Drying, Printing and Finishing Machinery

FOR

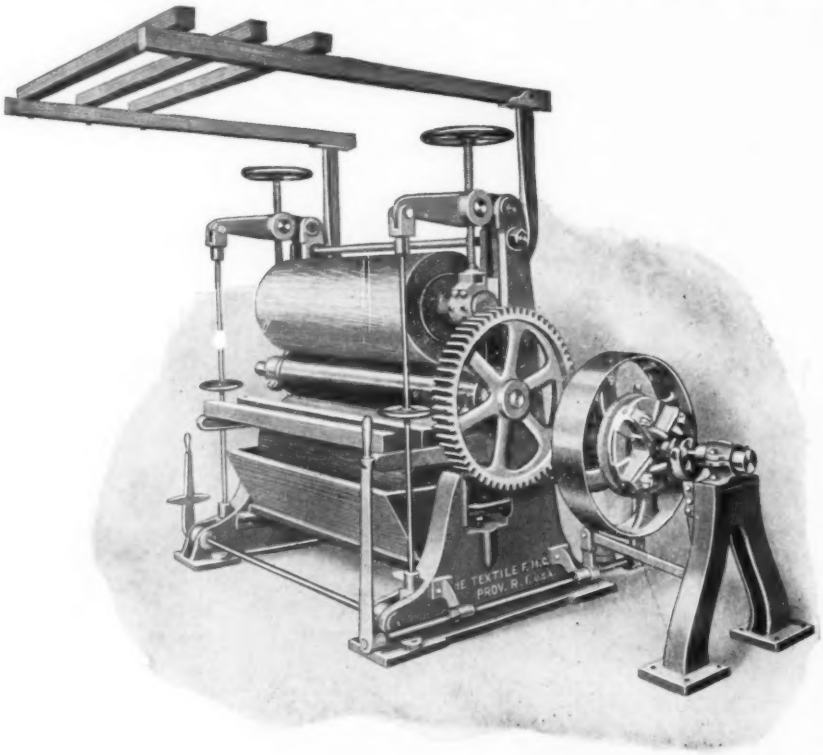
Textile Fabrics and Warps

PLANS AND ESTIMATES FOR COMPLETE PLANTS

It is impossible to fully cover the machinery we build in an advertisement or to even mention the many improvements or new machines we are constantly designing and building for the great variety of processes necessary in treating textile fabrics for the numerous purposes to which these are put in modern life. We have expert engineers and expert textile finishers in our employ. If you will write stating as clearly as possible the class of goods you wish to finish, the amount of yards or pounds per day, the width of woven goods, etc., full information will be sent to you, or one of our experts will call upon you and go over the question of equipment in person. We are the largest builders of this class of machinery in the United States.

Something new every month

Tenters with latest style of low frames and fitted with our double roller automatic universal clips and special entering attachments, especially designed for silk goods, but equally convenient for other textiles.



3-roll Mangle or Calender with new open style frame.

ALL KINDS OF MANGLES AND CALENDERS

with brass, rubber, wood, chilled iron, iron, paper, cotton, husk, and our

Special combination cotton-husk rolls.

M.I.T. 29 '17

M.L.M. 29/87/

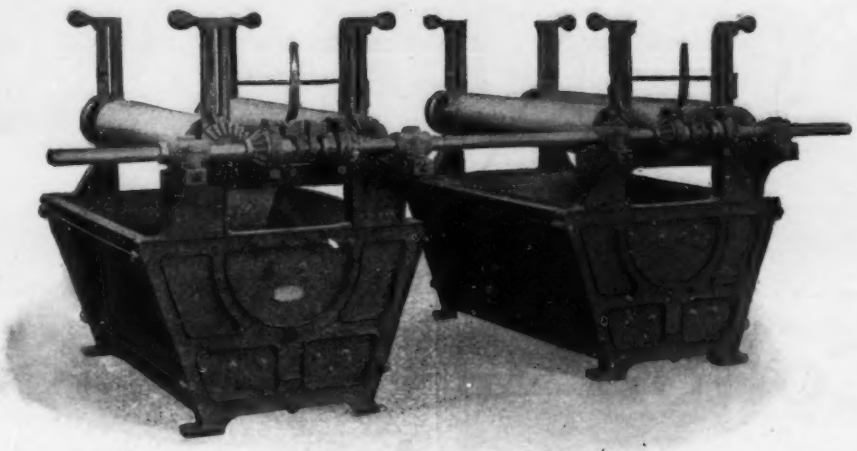
M.L.M. 62 / III / 2

17
435
Jat 21
49
M.L.M. 29 II/12

H. W. BUTTERWORTH & SONS CO.

PHILADELPHIA, PA.

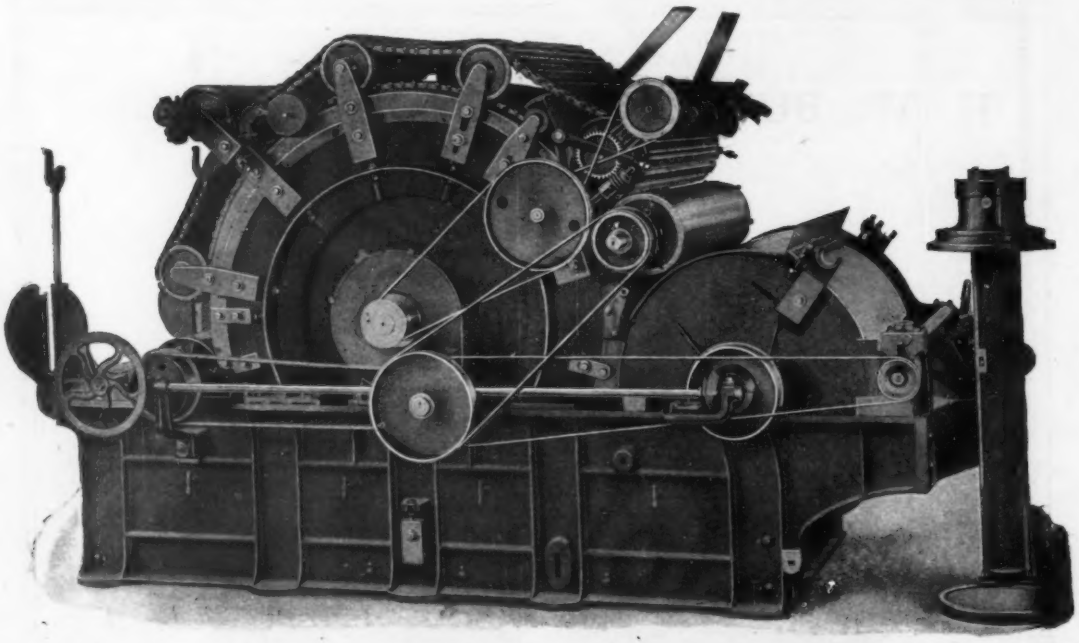
Providence Office, Room 417, Industrial Trust Building.



JIGGER

Bleaching, Drying, Dyeing and Finishing Machinery

for all textile fabrics.



Cotton and Worsted Machinery

With Modifications to Suit Any Class of Work.

Cotton Machinery: Cards, Railway Heads, Drawing Frames, Fly Frames, Speeders, Ring Spinning Frames, Twisters, Spoolers, Reels, Warpers, Slashers, Winders, Looms, Shearing Machines, Balling Machines, Folders, Stamping Machines, Sewing Machines, Size Pumps, Size Kettles, Drawing-in Frames, Baling Presses, Indigo Grinders.

Worsted Machinery: Spinning Frames with caps, rings or flyers, Dandy Rovers and Reducers, Cone Second Finishers, Reducers and Rovers, Gill Boxes for Drawing, Preparing and Finishing, Weigh Boxes and Drawing Boxes, Cap Trap, Flyer and Ring Twisters.

Plans, Specifications and Estimates furnished upon application.

Lowell Machine Shop

LOWELL, MASS.

THE MacColl Patent Spooler Guide

will, with a much more open setting, remove slubs or bunches that would pass through other spooler guides;
it will allow small piecings and knots which are unobjectionable to pass through;
it will pluck loose slubs and imperfections from the yarn without breaking, holding the slubs, etc., in the teeth until they are cleaned;
it is easily set, cleaned and adjusted;
as it works with a larger opening it requires less frequent adjusting than other guides.

On worsted yarns the production in after processes is greatly increased, as the yarn is delivered practically free from slubs and it is unnecessary to stop continually to remove these imperfections.

DRAPER COMPANY

HOPEDALE, MASS.

J. D. CLOUDMAN, Southern Agt, 40 So. Forsyth St., ATLANTA, GA.

THE EMPHATIC SUCCESS OF OUR "IDEAL" AUTOMATIC LOOM IS DUE TO SEVERAL SALIENT POINTS OF SUPERIORITY OVER ALL COMPETITORS:

1st. The ease and smoothness with which they start up.

2d. The acknowledged superiority of the cloth woven.

3d. Simple and thoroughly mechanical construction, assuring freedom from the constant breakage and expensive repairs attending other automatic looms.

4th. No special bobbins, shuttles or other expensive parts.

5th. Ability to use cop or bobbin filling interchangeably.

6th. Superiority of warp stop motion which does not break or fray the softest yarn.

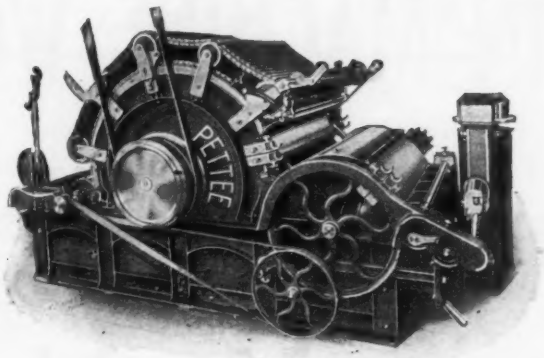
7th. Of the thousands in operation not a single bobbin or crank shaft broken.

IN PROOF OF CLAIMS WE POINT TO THOSE MILLS FORMERLY USING OUR COMPETITORS' LOOMS THAT ARE NOW USING OURS.

The Stafford Company

Readville, Mass.

Saco-Pettee



Double Carding System

Insures

Superior Quality
Increased Production
Low Cost of Manufacture

Particulars upon application

SACO-PETTEE COMPANY

Shops: Newton Upper Falls, Mass.—Biddeford, Me.

Southern Agent: A. H. WASHBURN, Charlotte, N. C.

The

WHITIN MACHINE WORKS

Whitinsville, Mass.

BUILDERS OF

Cotton Machinery

CARDS	SPOOLERS
COMBERS	TWISTERS
DRAWING FRAMES	REELS
ROVING FRAMES	Long Chain Quillers
SPINNING FRAMES	LOOMS

Southern Agent:
STUART W. CRAMER,
Charlotte, N. C.

"KITSON"

Means Guaranteed Machinery

No installation left by us until running satisfactorily.

PLANS FURNISHED WITHOUT CHARGE.

OUR STANDARD PRODUCTS:

Bale Breaking Feeders
With Patented Mixing Feed Table.

Blowing Systems of all Descriptions
Our specialty in this line is the EXHAUST SYSTEM wherein no stock passes through fans.

Morton Automatic Distributor
Supplies Opener Feeders Automatically.
Also adapted to feeding Bins.

Condenser System
For small mills not requiring Distributor.

Self Feeding Openers **Lappers**
Waste Openers **Waste Cleaners**
Cleaning Trunk **Raw Stock Dryers**

Repair Parts for machines formerly built by
Whitehead & Atherton, Lowell, Mass.
Atherton Machine Co., Lowell, Mass.
A. T. Atherton Machine Co., Pawtucket, R. I.

Write for Catalog.

KITSON MACHINE SHOP, Lowell, Mass.

LEIGH & BUTLER

SUCCESSORS TO

EVAN ARTHUR LEIGH

232 Summer Street (opposite the South Station), Boston, Mass.

SOLE AGENTS

IN THE UNITED STATES AND CANADA FOR

Platt Bros. & Co., Ltd.

BY FAR THE LARGEST MAKERS IN THE WORLD OF

Cotton, Woolen and Worsted Machinery

Platt's Patent Opening and Picking Machinery.
Platt's Cotton Comber will comb from 7-8" stock to Sea Islands.
Platt's Special Machinery for Making Cotton Waste Into Yarns.
Platt's Special Machinery for Making French Worsted Yarns.
Platt's Woolen and Worsted Carding Engines, Special Designs.
Platt's Cotton, Cotton Waste, Woolen and Worsted Mules.

MATHER & PLATT, LTD.

Dyeing and Finishing Machinery.
Archbutt-Deeley System for purifying and softening water.

THE PATENT AUTOMATIC FEEDING MACH. CO., LTD.

Patent Feeding Machines for wool, cotton, flax, fur and fibrous material

JOSEPH SYKES BROS.
Card Clothing for Cotton.

JAMES CRITCHLEY & SONS,
Card Clothing for Woolen and Worsted

WILSON BROS. BOBBIN CO.'S

Bobbins, Shuttles, etc.

Dronsfield Bros. Grinding Machinery and Emery Filleting. The Best French and English Combing and Rubbing Aprons. Harding's Pins and Circles. Varey's Fallers, etc.

Duplan Silk Co., Hazelton, Pa.

You should not buy a humidifying system, knowing that in case it is found of insufficient size, then you can buy additional humidifiers required at a certain price each.

When you buy a humidifying system you are not buying iron or brass or copper by the piece or pound, for you find these things cheaper if bought under the proper specifications.

In buying a humidifying system, you are mainly interested in results, not weight nor the price per humidifier. Of course there must be sufficient material to give the results and you want to be fairly certain that enough weight is to be furnished.

Your business is operating a mill, so there is no particular reason why you should take the responsibility of the size of the equipment to be furnished.

Therefore, insist upon having a guarantee to give you the required results during all seasons.

The Carrier System is guaranteed to give the required results continuously —temperature as well as humidity.

Carrier Air Conditioning Co.

Of America

No. 39 Cortlandt Street, New York City

(165-C.)

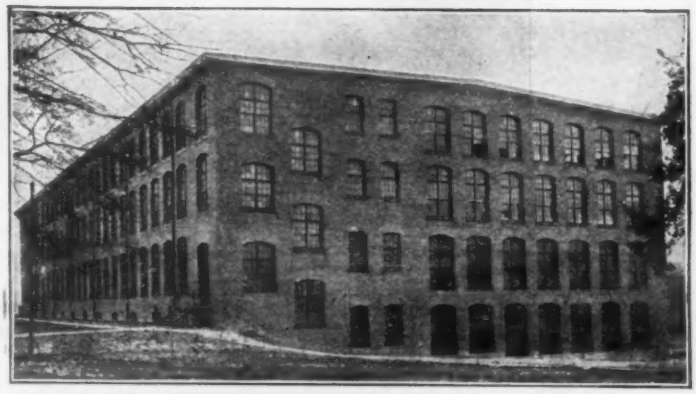
RICE'S MILL WHITE

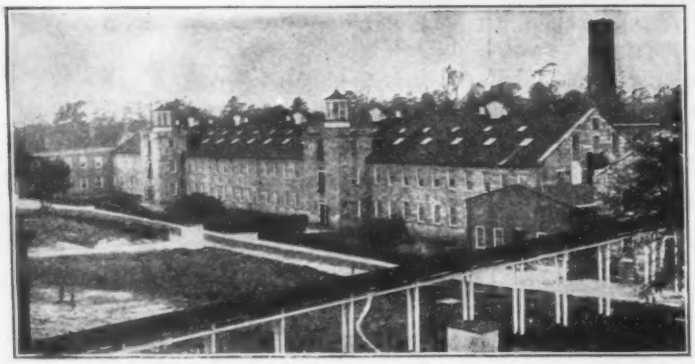
"The Paint That Brims Over With Sunlight"

Makes OLD and NEW Mills Bright

This new Graniteville Mill (or Hickman Mill) was built in 1900. To multiply the value of all the natural light that entered it and to diminish shadows, the interior was finished with Rice's Mill White.

The beneficial results from using this light-reflecting paint were so obvious and so economical and helpful in general that the Company decided that the interior of the **old** Graniteville Mill should also be painted with Rice's Mill White.





This **old** Graniteville Mill, at Graniteville, South Carolina, is the oldest mill in the South which has been in constant operation. The machinery was started in 1847.

Although this **old** mill had, in comparison with modern structures, small windows (see illustrations) it was found that the *light-reflecting, light-multiplying* qualities of Rice's Mill White made the working conditions in the **old** mill compare favorably with those in modern structures — not painted with Rice's Mill White.

Whether your mill is old or new, Rice's Mill White will save money for you, because it improves sanitary conditions in the mill, dust will not adhere to it, it does not crack or crumble, can be washed without injury to its light-reflecting surface, two coats of it will cover better than three of lead and oil.

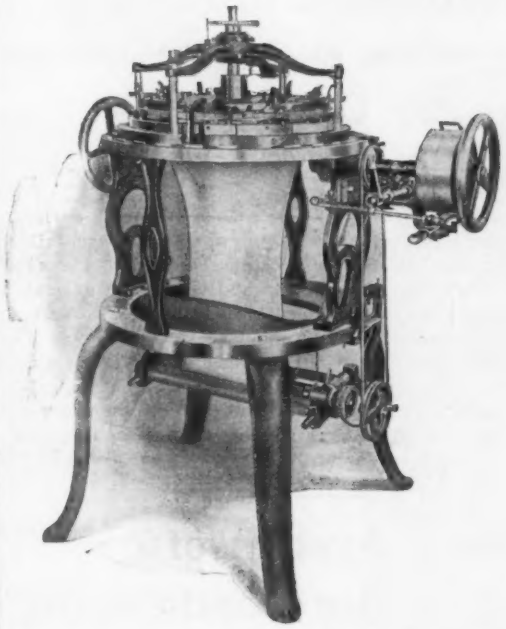
Rice's Mill White multiplies the natural light, improving the working conditions and shortening the length of time that artificial light is ordinarily needed. It also multiplies the illuminating value of artificial light, the increased illumination in both cases being from 19 to 36 per cent.

Send for literature that proves these claims, or if you wish to save time, accept the following.

FREE OFFER—IT PROVES OUR CONFIDENCE—We will send a gallon of Rice's Mill White free to any mill owner willing to pay expressage and mention this publication. ACCEPT IT TODAY.

U. S. Gutta Percha Paint Co. (Originators of Mill White Paint) **Dept. "A.," PROVIDENCE, R. I.**

Machines for profitable production of underwear and hosiery



EVERY kind of machine for the requirements of the underwear and hosiery manufacturer can be supplied by us.

Our recent affiliation has given us excellent opportunity to still further improve our respective machines and increase the efficiency of our service.

Scott & Williams, Inc
Geo D Mayo Machine Co

This underwear machine is the very latest in patented labor-saving and profit-making features.

The features are the inserted-wall cylinder, the adjustable dial-plate, and the sectional ring-cap.

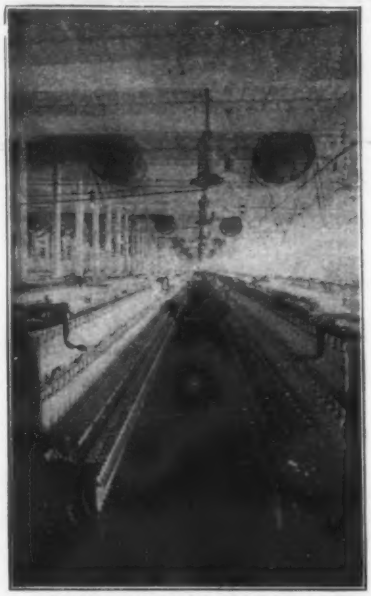
Each invention is a distinct advance, and unique in its workings.

Write for full information about this and all our other machines.

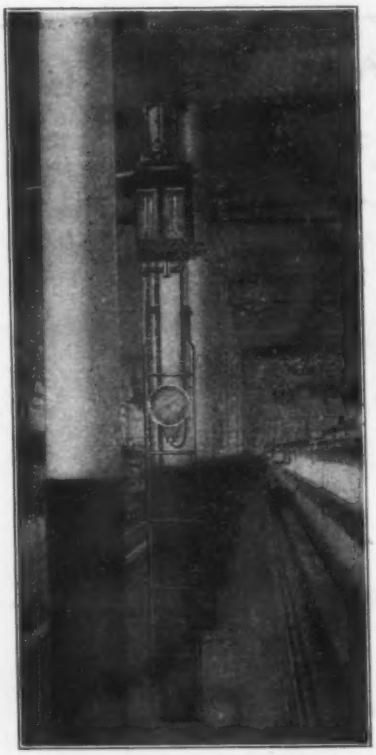
Scott & Williams, Inc **Geo D Mayo Machine Co**

General Office: 201 Devonshire Street, Boston

Philadelphia Showrooms: Knickerbocker Bldg, 6th and Arch St.



AIR CONDITIONERS IN SPINNING ROOM.



AUTOMATIC REGULATOR MOUNTED ON COLUMN IN SPINNING ROOM.

Imitation is the Sincerest Form of Flattery, But—

Manufacturers are hereby warned against using infringements upon the Cramer patents for

Automatic Regulators

for Humidifying and Heating Systems and

Air Conditioners

of the Spray Type with Fans!

Before considering the purchase of infringing devices, make sure that the vendor is amply financially responsible and guarantees to indemnify the purchaser against loss by damage suits, for both infringers and users of infringments, however crude such infringments may be, will be prosecuted to the full extent of the law.

Don't be imposed upon by misleading terms and claims as to what the vendor's patents cover; anyone can get a patent for almost anything in the way of specific constructions; the vital question is whether or not such patents infringe other prior patents.

Cramer System of Air Conditioning

Vital Requirements for an Automatic Regulator:

(1) There must be *no wicking* on the wet bulb member *"to bother with and give trouble, and cause inaccurate indications."*

(2) Both the dry and the wet bulb members *must indicate actual temperatures that can be read*, that the alleged accuracy of the device may be checked up by the purchaser at all times.

(3) The materials of which the dry and wet bulb members are made must *be well known to be durable*, and permanent under the trying conditions of moisture and temperature changes.

STUART W. CRAMER

Charlotte, N. C.

Providence, R. I. **Atlanta, Ga.**

OSWALD LEVER CO.

(INCORPORATED)

Lehigh Avenue and Hope Street

PHILADELPHIA, PA.

Hosiery Winders

To wind from the skein to the knitting bobbin in all sizes to suit any kind of yarn.

Cross Traverse Quillers

To wind direct from the skein or twister spool onto cops, butts, wood quills or paper tubes, to suit any grade of yarn from the coarsest of jute or duck to the finest of mercerized.

BUILDERS OF

Textile Machinery

WINDING A SPECIALTY

POTTER & JOHNSTON MACHINE CO.

PAWTUCKET, R. I., U. S. A.

SOUTHERN REPRESENTATIVE:

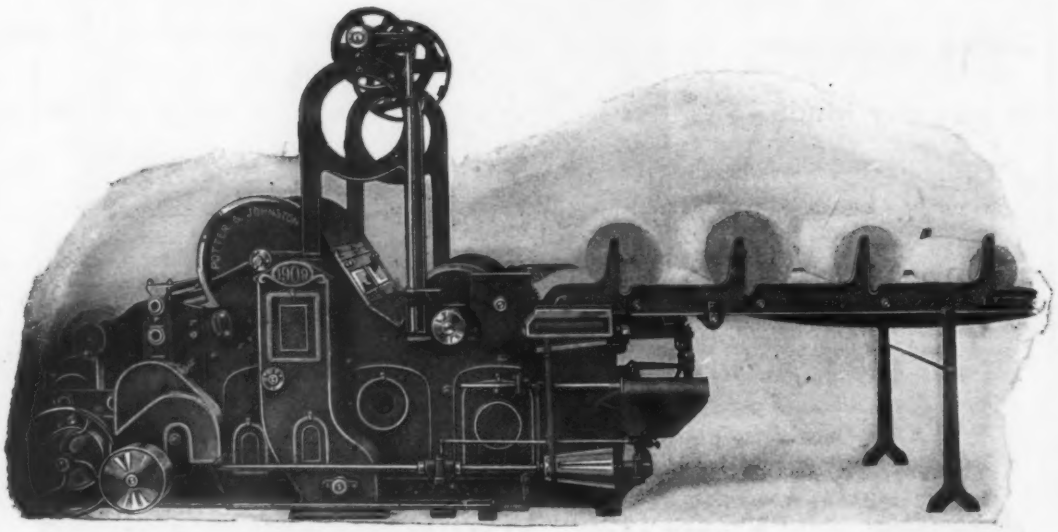
J. H. MAYES,

CHARLOTTE, N. C.

NORTHERN REPRESENTATIVE:

WM. MUIR,

PROVIDENCE, R. I.



SINGLE BEATER FINISHER.

Picking Machinery

MADE BY THE

POTTER & JOHNSTON MACHINE CO.,

has many new and valuable improvements, the workmanship and materials used are of the same high class as have characterized our products for many years.

Our textile machinery is made by the same tools and processes and with the same care and precision as enters into our machine tool work. The Beater and fan shafts are ground, all studs are case hardened and ground. High speed gearing is all cut, and fast running pinions are made of steel, cut, and case hardened. All medium and high speed bearings are ring oiling, the beater and fan bearings having been designed to overcome the trouble of oil leakage, which every carder knows has caused him serious annoyance by getting inside of the machine and onto the cotton, to say nothing of the cost of the oil. These bearings are oil-tight and neither allow oil to be drawn inside of machine or to leak outside.

The evener mechanism is so constructed that friction has almost been eliminated, and as a result, the slightest changes in thickness of laps will cause the necessary movement of the evener belt. This, of course, ensures an evenness of finished lap heretofore considered impossible.

Combined with the countershaft shipper handle is a locking device for the beater bonnet. This device locks the bonnet on starting, or if the bonnet is open the shipper is locked so that the machine cannot be started.

Improved forms of grid bars are used, the angle bars having milled knife edges, true and parallel to the edge of beater blade. The flat dust bars are made of sheet steel, and owing to their thinness are able to use over double the usual number and still keep the same space between bars and thus obtaining better cleaning action.

Between the cage stripping rolls and the lap head we have applied our patented Anti-Split rolls, which prevent split laps. There are two of these rolls, the lower one is composed of a series of steel disks on a shaft, which run in corresponding grooves in the upper roll, the cotton passing between them is corrugated lengthwise with small ribs which are pressed down by the calendar rolls into reinforced strips binding the sheet together.

The brake motion for the lap racks is adjusted by set screws for any desired friction, and change in same can be very quickly accomplished.

Everything about the machine is substantial, and in all its refinements none have been attained by a sacrifice of strength or ample wearing surface. We guarantee this picker to do better cleaning and evening with less cost for power, oil, and repair than any other machine on the market. The quality of the workmanship throughout is well illustrated by the fact that when running either idle or operating on cotton one can hardly tell from the sense of hearing that gears have any place in its construction, and the general appearance of the machine is such as to commend it to all who like nice lines and high finish in the machinery of their mills.

We have finished machines at our works that are at all times open for inspection, as well as our shop and manufacturing processes.

Mill Cleaning Revolutionized

A thoroughly clean mill is hard to find. Not because of indifference to dirt, but because it has been so difficult to get rid of. The spirit was willing but the equipment was inadequate.

The Turbo Vacuum Cleaner

Comes to the Mill Man's Relief

With this device you can keep your mill thoroughly clean—always. The Turbo Vacuum Cleaner is as efficient in its mill work as the best household vacuum cleaner obtainable is for home use. It makes floor and ceiling *sweeping* unnecessary.

Note these points of quality:

Low vacuum. Portable. Small enough to use in narrow alleys. Operated by compressed air, the only practicable power. No moving parts, no gears—a boy of twelve years can safely and efficiently operate it. There is nothing about it to oil, wear or break. Weighs but 15 pounds.

With the blowing nozzle attachment, dirt in inaccessible places (on machinery, etc.) can be blown to the floor and then cleaned up with the vacuum.

The Turbo Vacuum Cleaner will remove waste, powder, bits of yarn and cloth, dust and lint, etc. It picks up metal as heavy as pennies and shingle nails.

Despite its great utility, this Cleaner is low in first cost and maintenance expense. The savings it effects in mill brooms, cleaning labor and in machines and material kept clean by the absence of dirt, are so great that it will not take long to make up the cost of equipping your mill with it.

(Made by the makers of the TURBO-HUMIDIFIER)

Ask for: "*The Story of the Birth of the Turbo Vacuum Cleaner.*"

TURBO TRADE MARK HUMIDIFIER

The G. M. Parks Company

FITCHBURG, MASS.

Southern Office, No. 1 Trust Building, Charlotte, N. C.

B. S. COTTRELL, Manager

FIRE-PROOF "HURRICANE" DRYERS

(Steel Construction with Asbestos Insulation)

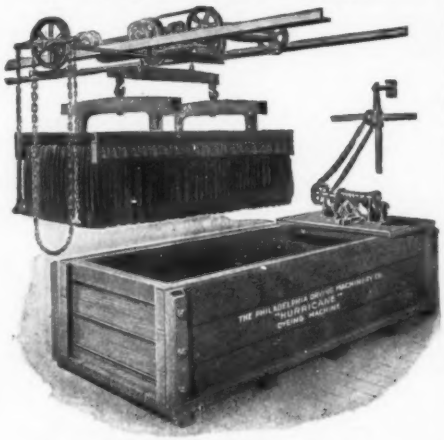
Built in many sizes and types for

Raw Stock, Yarn, Cloth, Knit Goods, etc.

"Hurricane" Circulating

DYEING MACHINES

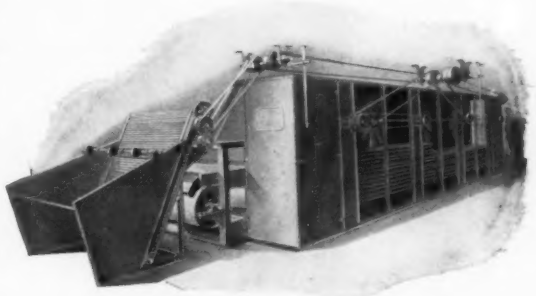
For Yarn, Slubbing, Hosiery, Etc.



Installed in Leading Mills and Dye Houses

Do better work with Less Labor, Steam and Chemicals

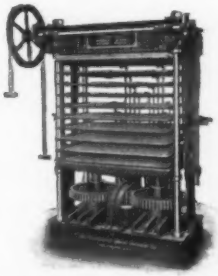
COMPLETE EQUIPMENTS FOR
DYEING, SCOURING, BLEACHING, CARBONIZING



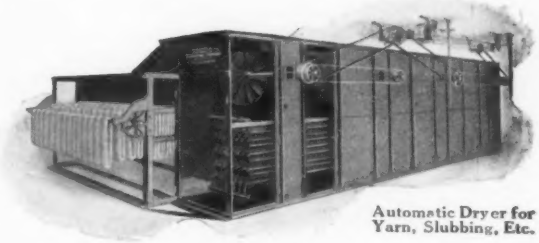
Automatic Dryer for Cotton Stock, Wool, Hair, Rags, Etc. Built with or without Self Feeds.

FANS

MOTOR AND BELT-DRIVEN



Power Screw and Hydraulic } **PRESSES**



Automatic Dryer for Yarn, Slubbing, Etc.

THE PHILADELPHIA DRYING MACHINERY CO.

6721 Germantown Avenue, Philadelphia, Pa.

Present Business Conditions Necessitate Rigid Economy

With "UNIVERSAL FILLING" in a cotton mill

1. You can make a 10% cash saving in costs of weaving.
2. 12 loom sets will give 5% per loom increased production over 8 loom sets with regular spinning bobbins.
3. Seconds practically eliminated.

Universal Winding Co.
BOSTON

Thomas Leyland and Company

F. T. WALSH, Manager

60 India Street, - - - Boston, Mass.

Sole Manufacturers and Agents for

The William Mycock Textile Machine Specialties:

The Mycock Regulating Cloth Expander, (Patented) **for Dry Cans, Calendars and Water Mangles**

The Whaleback Piece End Sewing Machines, (Patented)

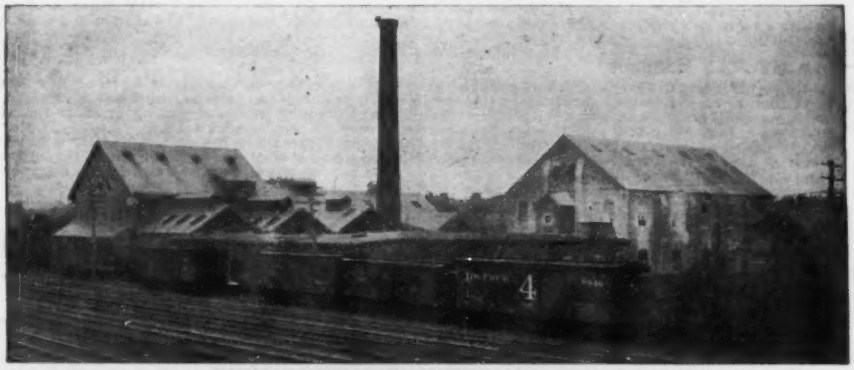
Portable Piece End Sewing Machines, (Patented)

Scutchers

Guides

Cloth Plaiting Down Machine for Bleacheries

This cut shows our works at Readville, Mass., where these machines are built



HARWOOD'S MACHINERY

INCREASES PRODUCTION, IMPROVES QUALITY, DECREASES LABOR COST, AND INSURES THE PROSPERITY OF YOUR BUSINESS

The Bramwell Self-Weighing Feeder

For Woolen, Worsted, Hosiery and Shoddy Cards and Garnet Machines

We began introducing this feeder more than twenty years ago and its use is now practically universal. Many other types and makes have been tried and discarded, but the **BRAMWELL**, in its improved and up to date form, is now recognized everywhere as the most perfect feeder and only complete feeding machine in the world.

Our long experience has proved conclusively that where evenness is required—determined by weighing—our weighing feature is absolutely indispensable. Several attempts have been made to introduce feeding machines ignoring this principle, but none have succeeded.

We have made a careful study of all phases of the feeding problem, and by adaptations and modifications of the Bramwell feeder to meet the particular conditions, are prepared to feed evenly all kinds of stock, from rabbit's fur to jute tow, including shoddy, cotton, fine wool, mixtures, fine and coarse worsted, flax tow, long worsted and all other kinds of stock.

The Apperly Feeder

For Second Breaker and Finisher Cards

This machine was originally brought to this country and introduced against great opposition by the founder of this concern, the late Geo. S. Harwood. To-day there are about 15,000 machines of our construction running in this country and Canada. We have greatly improved the machine. It is to-day an efficient, positive and up-to-date feed, and we can offer manufacturers the choice between the KEMP POSITIVE GEARED TRAVELER and the STANDARD TRAVELER with all recent improvements.

The Bramwell Picker Feed

For Burr Pickers, Mixing Pickers, Fearnaughts and Lumpers

We consider our improvements in picker rooms of the utmost importance for up-to-date manufacturers. In fact, wide-awake manufacturers are more and more realizing the wisdom of bringing their stock to the card room in a better state of preparation. Hand feeding is becoming a thing of the past in the picker room as in the card room. The latest Bramwell Picker Feed is built to handle all kinds of stock in any quantity with evenness and without injury to the staple. The extensive introduction of our feed in first-class picker rooms has led to the successful introduction of

The Spencer Automatic Stock Oiling Machine

This is a modern device for oiling the stock automatically on its way to the picker from the Bramwell Picker Feed, superseding the wasteful, dirty method heretofore in use. Because of the accuracy of this method and the fact that the oil goes on the stock only (instead of the floor and walls), there is a large saving of oil, and the stock is at the same time more evenly oiled and much better prepared for the carding process.

The Modern Bramwell Feed for Wool Washers and Wool Dryers

The scouring and drying of stock is to-day recognized as a very important part of the manufacture of textiles, especially in worsted mills. Our feeds are recognized as the standard for properly feeding stock in the grease or wet stock with absolutely no injury to the staple, with evenness and in sufficient quantity and in the best possible condition for economical scouring. There have been other feeds offered for this class of work, but after clogging up and giving all kinds of trouble most of them are to-day in the scrap heap, having been replaced with our feeders.

Repairs and Improvements for Old Feeders

We have not been standing still all these years and the feeders we are building to-day are modern and up to date, but these improvements and attachments can be placed on older feeders of our construction greatly to their benefit. We do not hesitate to claim that **no outlay will show a greater return** to a manufacturer than money spent in bringing your Bramwell and Apperly Feeds thoroughly up to date.

Aprons of All Kinds

We build about thirty different styles of spike aprons adapted to the various kinds of stock our feeders are called upon to handle. Our policy is and will be to put into our aprons the **best** materials and workmanship money can buy. We know we could make cheaper aprons by using cheaper materials and less expensive labor, and it would take manufacturers some years to find us out. The apron would LOOK nearly as well, but would WEAR only two or three years instead of from five to ten or twelve. Do not trust the man who says he can sell you aprons cheaper than we can. He can do it (and so could we), but you pay the bill in the end. The best is none too good and is the cheapest in the long run.

Call on us for particulars and information about all matters relating to Feeding Machinery

GEO. S. HARWOOD & SON

53 State Street, Boston, Mass.

Telephone, 3212 Main

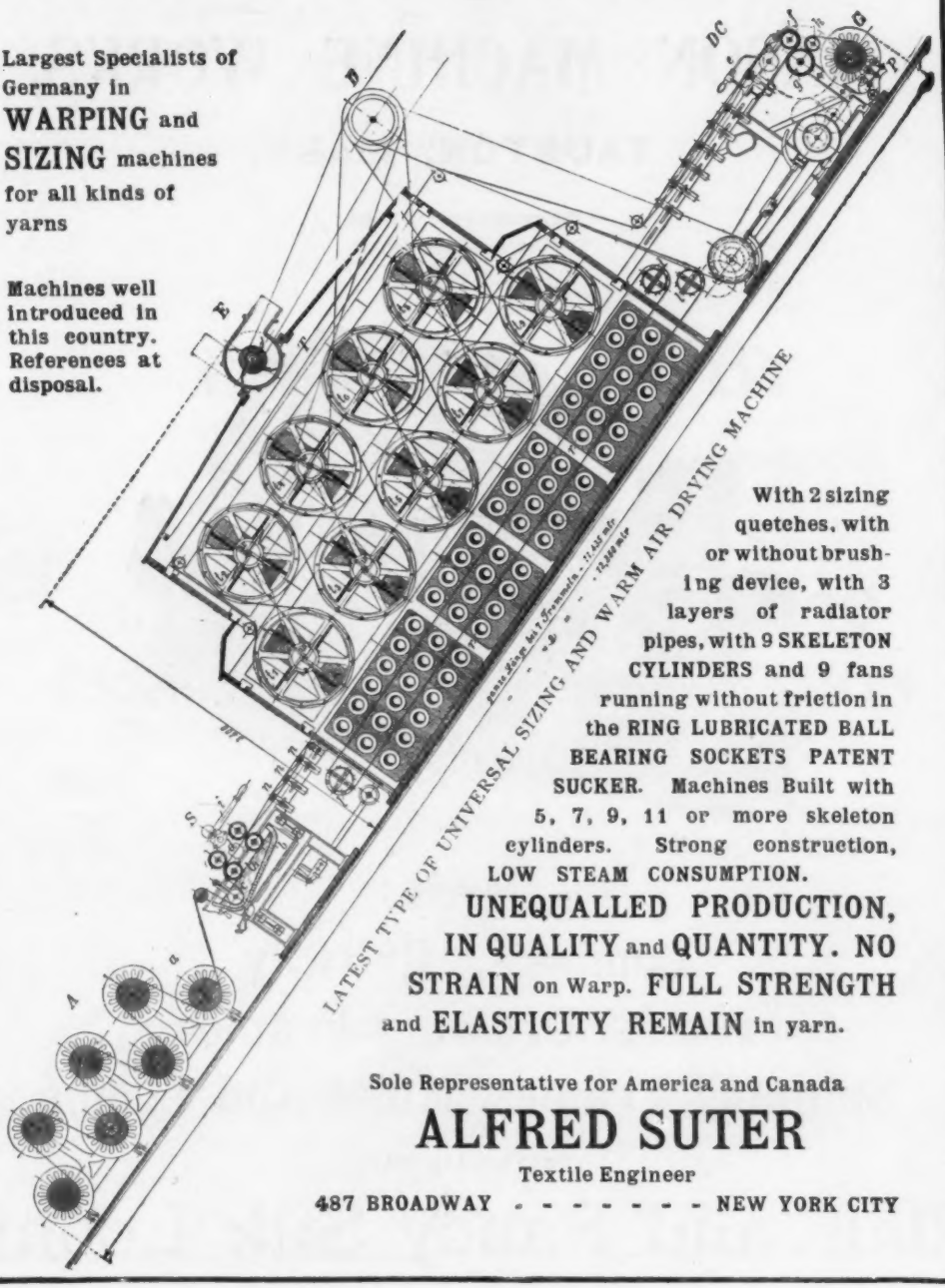
Works: HARWOOD & QUINCY MACHINE CO., Worcester, Mass.

MAKE ALL SHIPMENTS TO OUR WORKS

GEBRUDER SUCKER GRUENBERG

Largest Specialists of Germany in WARPING and SIZING machines for all kinds of yarns

Machines well introduced in this country. References at disposal.



With 2 sizing quetches, with or without brushing device, with 3 layers of radiator pipes, with 9 SKELETON CYLINDERS and 9 fans running without friction in the RING LUBRICATED BALL BEARING SOCKETS PATENT SUCKER. Machines Built with 5, 7, 9, 11 or more skeleton cylinders. Strong construction, LOW STEAM CONSUMPTION.

UNEQUALLED PRODUCTION, IN QUALITY and QUANTITY. NO STRAIN on Warp. FULL STRENGTH and ELASTICITY REMAIN in yarn.

Sole Representative for America and Canada

ALFRED SUTER

Textile Engineer

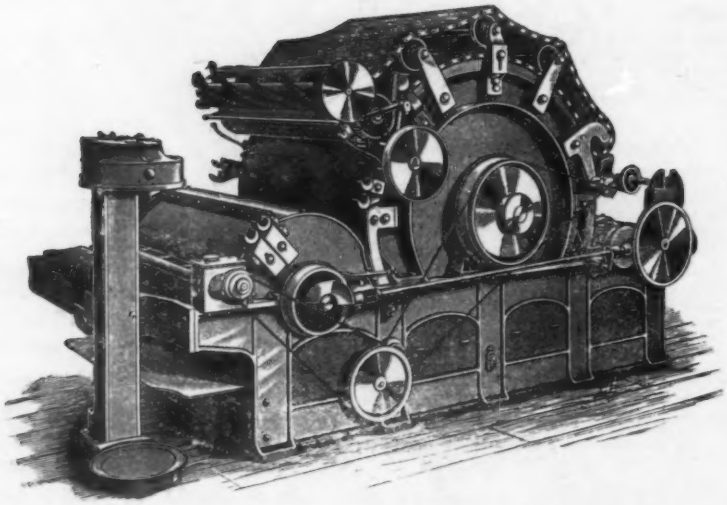
487 BROADWAY - - - - - - - NEW YORK CITY

Cotton Machinery

MASON MACHINE WORKS,

TAUNTON, MASS.

Southern Office,
Charlotte,
N. C.



Cards,
Combers, Railway
Heads, Drawing Frames
Spinning Frames, Mules and Looms

INCLUDING

Plain and Fancy Silk Looms

Dennison Textile Tags

Factory Organizers Recommend the Use of

Dennison Tags

In Mill Systems

OPERATIVES' TAGS
"HURRY" TAGS
STOCK ROOM TAGS
BIN TAGS

INSPECTED BY

---------- FOREMAN

DENNISON'S POP STANDARD

IN THE EVENT OF ANY DEFECT RETURN THIS TAG TO US WITH DETAILED EXPLANATION

No.---------- DATE----------

INSPECTION TAGS
INVENTORY TAGS
TRACING TAGS
PAY COUPON TAGS

System Tags are displacing Paper System Slips
Tags stand up well under hard usage

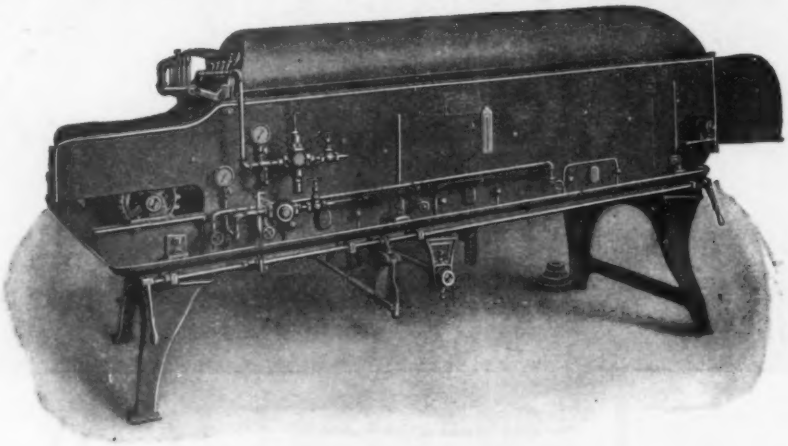
Dennison STANDARD TAGS ARE MADE OF TEAR-PROOF ROPE STOCK

Dennison Manufacturing Company

THE TAG MAKERS

BOSTON NEW YORK PHILADELPHIA CHICAGO ST. LOUIS

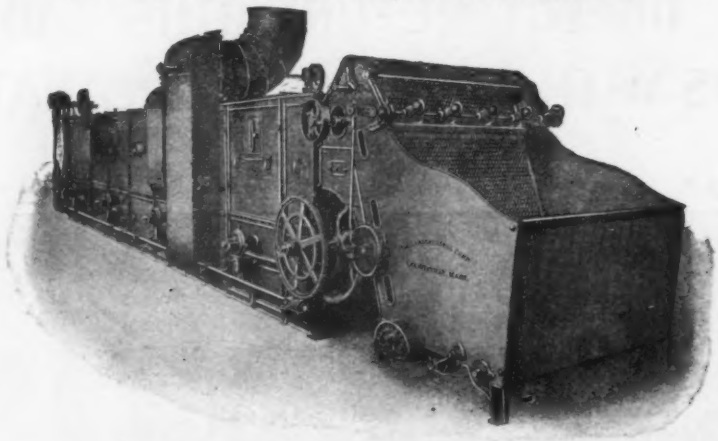
Yarn Conditioning Machine.



A Machine that Produces Results
An essential part of a modern mill equipment for uniformly conditioning yarns, without injury to bobbins
Absolutely controls the amount of moisture introduced into yarn

Sargent Drying Machines (fire resisting.)

Iron and Steel Construction, Asbestos Insulated.



For Cotton, Wool, Hair
Wool Washers, Wool Dusters and Openers
Carbonizing Dryers, Carbonizing Plants complete
Burr Pickers, Automatic Feeds for Cotton and Wool

C. G. SARGENT'S SONS, Corporation

GRANITEVILLE, MASS.

JAMES HUNTER MACHINE CO.

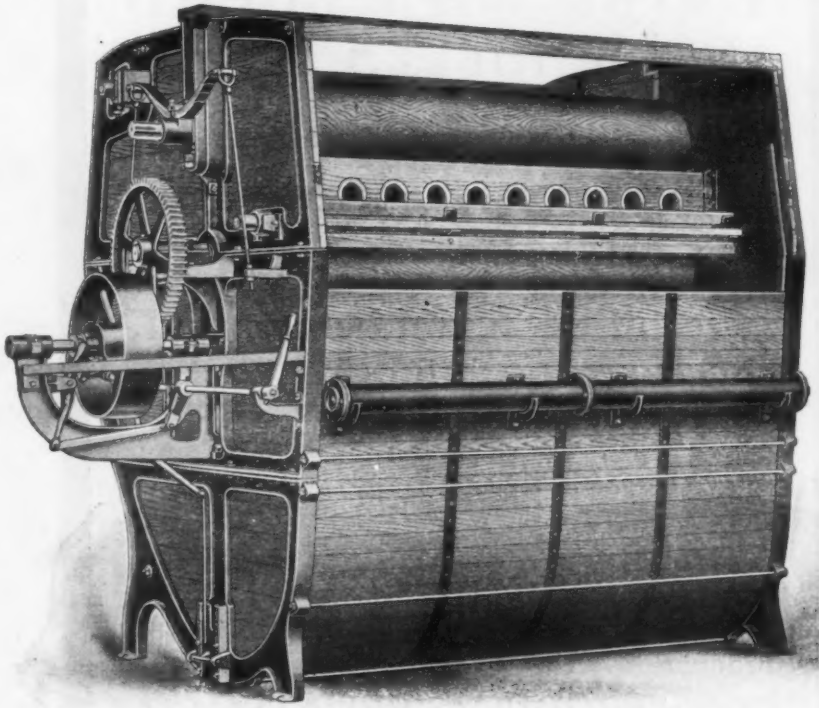
NORTH ADAMS, MASS., U. S. A.

Cloth Washer *Bulletin 51*

The Hunter

CLOTH WASHER

MODEL F



The Largest, Heaviest, Most Powerful Washer Built. For any number of strings. Get the Bulletin

Starch

A Prominent New England Mill had been sizing warps with potato starch for 25 years.

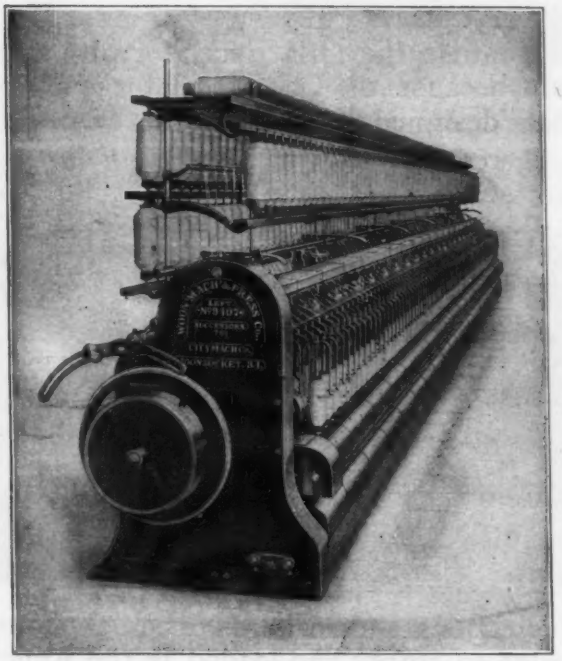
Tried our starch and was astonished at the results—smoother yarn and stronger, less breakage, quicker drawing in and tying in without stumbling, better separation, increased production.

If you want to know what we can do for your mill in better results and increased production write

CORN PRODUCTS REFINING CO.
NEW YORK

Starch

ROVING MACHINERY
OUR SPECIALTY



OVER 1,000,000
BALL BEARING TOP ROLLS
IN USE

Woonsocket
Machine and Press Company
WOONSOCKET, R. I.

Southern Agent: J. H. MAYES, 1112 Realty Bldg., Charlotte, N. C.

The Otis Escalator

Do not confuse the Otis Escalator with a moving incline belt or chain, because the Otis Escalator is a perfectly formed flight of stairs designed for ascending or descending travel.

When at rest, as shown below, the Escalator makes a perfect staircase.

The illustrations shown here are actual photographs made of two Escalators, empty and loaded, in the American Woolen Mills at Lawrence, Mass. Since the first four Escalators were installed in this plant the owners have added four more

These Escalators have proven their worth by landing the employees at their looms at the various floors in a more efficient condition for work than if they had walked.

These Machines at noon and at closing time carry the employees down.

Otis Elevator Company

Main Office, 17 Battery Place, New York City

Offices in all Principal Cities of the World

SEE ITS SIMPLICITY

There are only

FOUR PARTS

to the

SELLS ROLLER BEARING

The Split Box
The Split Roller Structure
The Split Collar
The Split Bushing

I'm holding the SPLIT BOX and SPLIT ROLLER STRUCTURE in my hands, and if you'll look on the line shaft you'll see the SPLIT BUSHING and SPLIT COLLARS.

Place the one half of the BOX and ROLLER STRUCTURE over the other, put in a couple of bolts, and the work is done.

They will fit any hanger, post hanger or pillow block of a corresponding size.

And then note the STEEL BUSHINGS that are clamped to the shaft. First, they act as a shaft protection. Second, by varying their thickness any SELLS BEARING can be made to fit three different diameters of shafting.

Next, note the SPLIT COLLARS. These also have a two-fold purpose.

First, they clamp the BUSHINGS in place.

Second, they form a rotating surface against which the ROLLER STRUCTURE runs.

These are one or two important features of the Sells from the mechanical side.

From the selling side they have the advantage in price of at least 40%, over the other bearings.

Send for *Sells Bulletin No. 1*, just issued, which fully explains their operation.

MANUFACTURED BY

Royersford Foundry & Machine Co., Inc.

MANUFACTURERS OF

Power Transmission Machinery and Punching and Shearing Machines

56 N. FIFTH ST., PHILADELPHIA, PA.

EUROPEAN OFFICE: Theodore Butler, Ltd., 149 Queen Victoria St., London, E. C.

"ROLLERINE"

A high-grade lubricant especially compounded for Roller and Ball Bearings.

COUPON

Gentlemen: Replying to your ad. in Textile World Record, Oct. '11 send me bulletin and booklet regarding Sells Roller Bearings.

Name .....

Firm .....

Firm Address.....

Business.....

Bearings now in use.....

THE METALLIC DRAWING ROLL COMPANY

Indian Orchard, Mass.

INCORPORATED 1890

MANUFACTURERS OF

METALLIC ROLLS

especially adapted to cotton carding room machinery, and applied to the following machines

SLIVER LAPS
RIBBON LAPS
COMBER DRAW BOXES
DETACHING ROLLS
RAILWAY HEADS
DRAWING FRAMES
SLUBBERS AND INTERMEDIATE ROVING

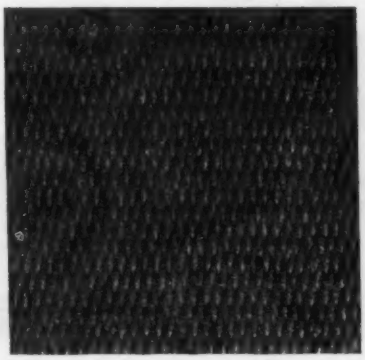
25 to 33% more product guaranteed.
Weights reduced from 33 to 50%

WRITE FOR PARTICULARS TO

THE METALLIC DRAWING ROLL COMPANY

Indian Orchard, Mass.

"Eelskin" Belting



Eelskin Belting, Fine Weave, Actual Size.

A strong, seamless, multiple-woven cotton belting, --- has minimum amount of stretch.

Is especially suitable for use on small pulleys.

"EELSKIN" BELTING can in many cases be used in place of leather belting with resulting economy.

Let us send you sample and descriptive literature.

Forsyth Braided Hose

For Air, Water or Steam

Is the best rubber hose that it is possible to make; it is made from high grade materials and the construction is such as to produce a very strong, durable and flexible hose. We should appreciate an opportunity to quote you prices.

RUBBER BELTING — PACKINGS — VALVES
NEW RUBBER-COVERED ROLLERS RE-COVERED
FOR ALL TEXTILE USES

BOSTON BELTING COMPANY

Home Office and Factories: BOSTON

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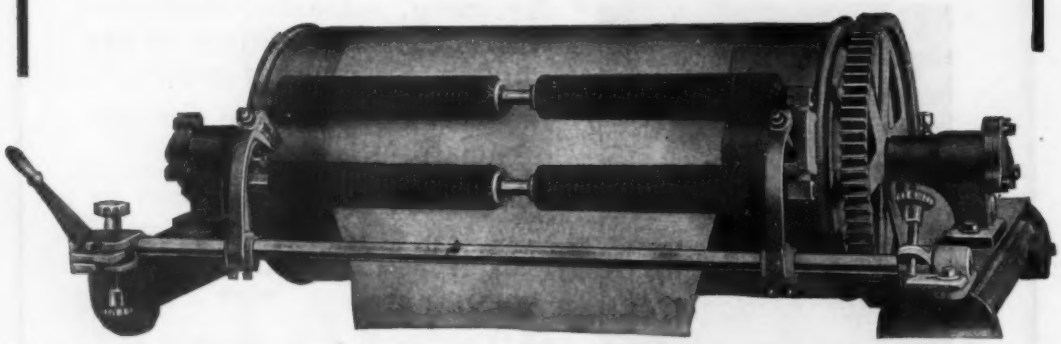
The Bristle Cloth Stretcher

(PATENTED)



Will not only ***stretch*** your goods but will ***hold the width gained.***

The Bristol Cloth Stretcher absolutely ***prevents wrinkles in silk printing.***

The Bristol Cloth Stretcher ***removes creases in calender.***

The Bristol Cloth Stretcher is being used successfully on goods varying in weight from heavy shoe duck to light silks and surgical gauze.

AMERICAN FINISHING MACHINERY CO.

141 MILK STREET, BOSTON, MASS.

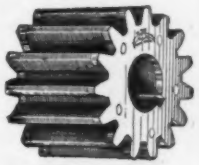
4 CANNON STREET, MANCHESTER, ENGLAND

Wouldn't it Pay You to Kill Those Gear Noises?

On a merry-go-round, the music is employed to kill the gear racket. We don't cite this as a suggestion that a brass band should be put in any shop or office, but pleasant surroundings are just as desirable during working hours as at other times. Employees do more and better work where there is no inharmonious ring and clatter, there is better feeling and less chance of costly misunderstandings and any man appreciates attention to his comfort.

Substituting New Process Noiseless Pinions for the ringing, rattling metal pinions on the high-speed gear drives in any shop, cuts the racket to an almost inaudible hum that is pleasant to the ear and does not interfere with conversation.

This certainly justifies a small outlay for New Process Pinions, but the change really involves no expense. The grinding wear, vibration and power loss—these are what noise indicates—disappear. The increased life of delicate machine parts makes the noiseless pinions highly profitable. We're ready to prove this from hundreds of installations—some in your own neighborhood. Write for booklet.



No. 36

NEW PROCESS IS TO ALL OTHER RAWHIDE AS STEEL IS TO IRON

The NEW PROCESS RAW HIDE Co.

OFFICE & WORKS N.P.R.H © REGISTERED SYRACUSE, N.Y.

LUBRICANTS

—For—

TEXTILE MILLS

Loom Oils

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Dynamo Oils

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Greases

BORNE, SCRYMSER COMPANY

ESTABLISHED 1874

80 SOUTH STREET, NEW YORK

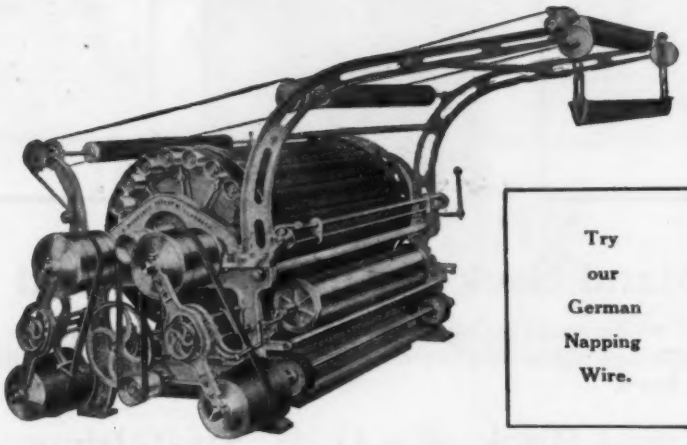
BOSTON FALL RIVER PHILADELPHIA

LATEST

NAPPING MACHINE

Monforts'

36 Roller Ball-Bearing



Try our German Napping Wire.

MORE than a SCORE of these machines recently sold to ONE mill

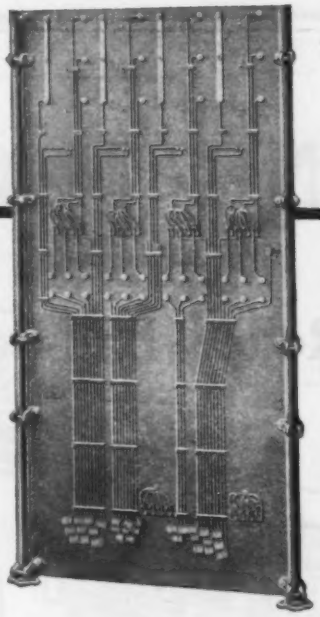
Compared to others it is

As a **Watch** to an **Alarm**-Clock

L. H. A. SCHWARTZ & CO.

53 STATE STREET, BOSTON, MASS.

Importers of FINISHING Machinery for Woolen, Worsted and Cotton Mills



One of fifty-six remote control panels recently manufactured for a large railway, power and lighting company.

Standard method of running small wiring on a G. E. Switchboard.

Stand Back of Any Switchboard

and you will see the conditions which vitally affect the entire control system. Just one loose contact or one broken wire may cause failures which cost more than the original price of the board.

Stand Back of a G. E. Switchboard

and you will see why thousands of these boards are in service today—each one a good investment, and an insurance against costly shut-downs and heavy repair expenses.

CLEAN CUT WIRING HELD FIRMLY IN PLACE CLOSE TO THE PANEL

All parts are made by the same company, eliminating divided responsibility, and the completed switchboard represents a compact, homogeneous equipment—an investment which it will pay you to investigate.

There is a G. E. Switchboard Specialist in your locality.
Further information will be promptly supplied on request.

General Electric Company

Largest Electrical Manufacturer in the World

Principal Office: Schenectady, N. Y. **Sales Offices in the following cities**

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3124

Mill Lighting

by Edison Mazda Lamps

Improved lighting with Edison Mazda Lamps will increase production, prevent accidents and please your operatives. Edison Mazda Lamps are now made with a filament of drawn wire tungsten which is many times stronger than the old pressed filament.

Edison Mazda Lamps will successfully withstand the shocks and vibrations of the average mill.

Edison Mazda Lamps, because of their flexibility of installation, will give the right amount of light just where it is most needed—they can be adapted to precisely your mill conditions or the class of textile you manufacture.

Mazda Lamps are used successfully in practically all the large New England Mills.

Write for bulletin. It contains valuable and complete information how Mazda Lamps will solve your lighting problems. This bulletin also offers you the assistance of our specialists in laying out your plans for an improved system of illumination throughout your mill. Write *to-day* for that bulletin.

General Electric Company

Main Lamp Sales Office:
HARRISON, N. J.

Principal Office:
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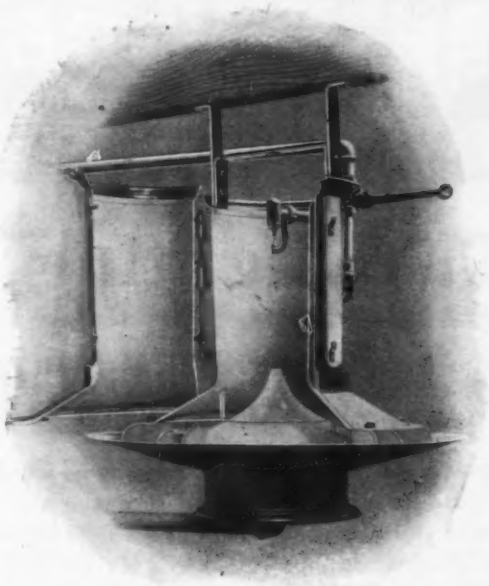
Over 22 Years' experience in

HUMIDIFYING

Textile Properties



Comins Sectional Humidifier
OPENED FOR CLEANING
(One of our various types of Humidifiers)

Every plant is carefully treated on its merits, and an equipment laid out to produce guaranteed results.

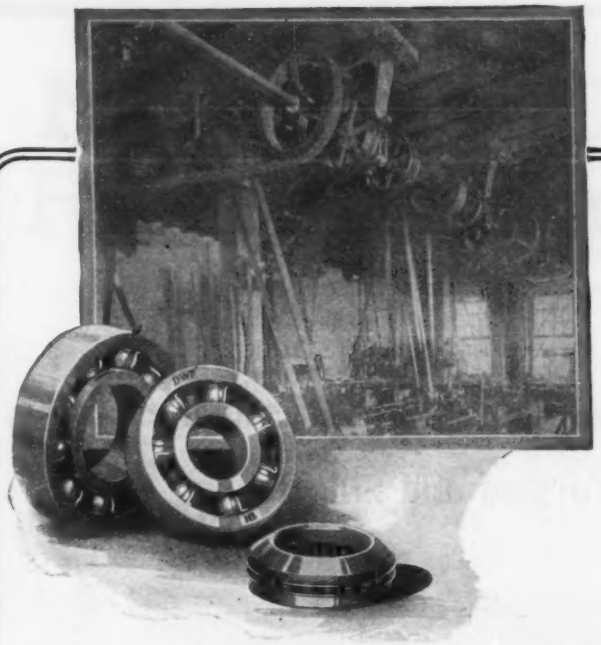
Over **70,000** of our **Humidifiers** in Service.

Correspondence Solicited.

AMERICAN MOISTENING CO.

120 Franklin Street, BOSTON, MASS.

WILLIAM FIRTH, President FRANK B. COMINS, Vice-President & Treasurer



Hess-Bright Hangers in Machine Shop of J. E. Poorman, Philadelphia, Pa.

If the Valves of Your Engine

needed resetting, and you employed an expert to do the job, how would you charge off his fee?

Against the cost of steam saved, naturally. And you would be the gainer by the difference.

The FRICTION LOSS IN YOUR SHAFTING is a heavier item than slipped eccentrics or short valve rods are ever likely to produce. In an average case it is likely to be one-fourth of the total demand for power.

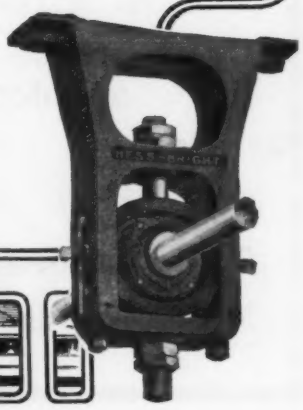
You can arrest it at once and with certainty, by installing

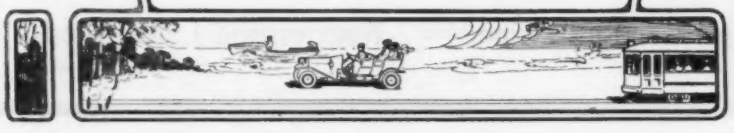
HESS-BRIGHT BALL BEARING HANGERS

on line and countershafts. They cost more at first than babbitted hangers—they must. So does a milling machine cost more than a chisel and file.

The vital point is that Hess-Bright Hangers ***save*** far more than they cost. They are a scientific solution of the friction problem, and no modern factory and shop manager can afford to overlook the economies they offer.

The Hess-Bright Manufacturing Co.
2121 Fairmount Ave. Phila., Pa.



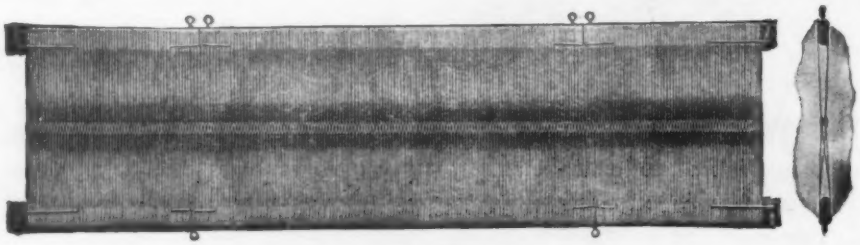


EMMONS LOOM
HARNESS CO.

May Street, Lawrence, Mass.

MANUFACTURERS

Cotton Harness, Mail Harness and Reeds for Cotton, Duck, Worsted and Silk Goods



Selvedge Harness
any depth up to 24 inches for weaving tape selvedges.

Beamer and Dresser Hecks.
Mending Eyes and Mending Twine.
Slasher and Striking Combs.
Warper and Leice Reeds.

The New Hand-Threading Shuttle

The Simplest—Most Effective Most Quickly Threaded Shuttle Made

Note These Points:

¶ Can be operated with the finest silk or the coarsest filling. ¶ Will not unthread when the yarn "balloons." ¶ Provision is made for easy removal of lint that may accumulate in the threading device. ¶ There is room for the insertion of felt for tension purposes. ¶ It complies with the Massachusetts sanitary shuttle law, and as other states are likely to enact similar laws, it is well to anticipate trouble by adopting this new shuttle.

Trial orders solicited.—Satisfaction guaranteed.

Paper Cop Tubes Cones and Shells

Send your samples and we will quote prices on any lot desired

Shuttles and Shuttle Irons

For All Textile Purposes

American Textile Specialty Machinery Co.

670 Eddy Street, - Providence, R. I.

New York Office, 363-373 Rider Ave.

IT WILL PAY YOU TO USE

TRADE MARK **FERALUN** REGISTERED

And here are the Reasons Why

What Feralun Is

Feralun is a material made of iron or steel with corundum embodied in it. It is therefore the most resistant surface possible to manufacture. It will resist abrasions better than iron or steel, and last three to five times as long as either iron or rolled steel plates.

Where to Use It

The textile manufacturer will find Feralun of exceptional value as a flooring, and for use on stairways, landings, sills or floor plates, and in other places where it is desirable to reduce to a minimum the possibility of slipping. As it will resist the action of acids, hot gases, ashes or other hot materials or corroding agents, it will reduce expenses by obviating the necessity for repairing wood and concrete, and other materials that have to be frequently replaced, as steps, floor plates, etc., and for ash and coal conveyors, grate bars, fire door liners, etc.

Damage Suits Obviated

As owners of mills, dyehouses, bleacheries, etc., are liable for injuries sustained by anyone using stairways that are in bad repair or slippery, it is desirable that this possibility should be prevented, and the only sure way is by the use of Feralun Treads, which can be placed on either wooden, concrete, or iron stairways, in old or new buildings.

No other slip-preventing device remains permanently effective, as does Feralun, as all others after a short time become worn or slippery, and in some cases more dangerous than if no anti-slip device had been applied.

A Big Help In Bleacheries and Dyehouses

Around the tubs in dyehouses or bleacheries where the soapy water gets on the floor, Feralun should be used to prevent slipping, for no matter how much soap or grease gets on Feralun, it is still effective and does not become slippery like other floorings.

Around Looms and Other Machines

Frequently grease and oil drop from machinery to the floor, making the space surrounding the machine very slippery, physically dangerous to the employees and financially dangerous to the employer. This can be prevented by the use of Feralun flooring, or by the use of Feralun floor plates at the dangerous spots.

Cheaper than Other Stair Steps

Besides saving you from the liability of damage suits, through slipping accidents on stairways, etc., Feralun will save you money in first and last cost because stairways on which Feralun treads are used will last so much longer than otherwise. Feralun Treads not only prevent slipping, but wear better than anything else on the market.

The Round Nose Treads

The nose of most treads soon gets smooth and slippery, but the Feralun Tread nose also is of anti-slip material, so that it remains really anti-slip under all conditions.

AMERICAN ABRASIVE METALS CO. AMCO PRODUCTS NEW YORK CITY

Textile Men for Safety and Economy should ask us for Proof that FERULUN is needed in Their Plants.

Please Address Inquiries to New York Office, Department H. M.

American Abrasive Metals Co.

52 Church Street, New York, N. Y.

PHILADELPHIA, 422 Arcade Building BOSTON, 331 Oliver Building

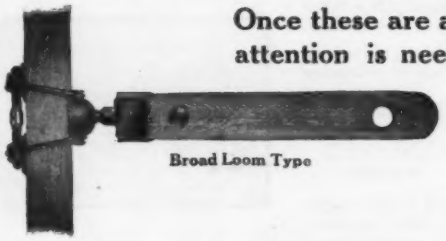
Cotton and Woolen Manufacturers CAN—

—Save Money on Picker Sticks
—Dispense with Lug Straps and Power Straps
—Avoid Screws and Screw Holes
—Prevent Lost Motion
—Increase Their Production
—and economize in other ways—

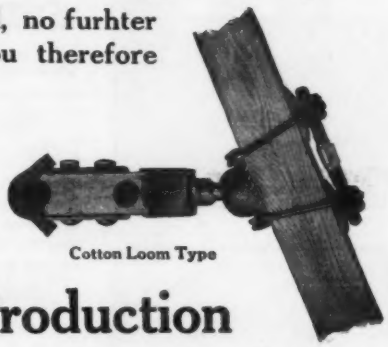
BY USING---

Faultless Metallic Anti-Lug Straps

Once these are adjusted, no furhter attention is needed, you therefore



Broad Loom Type



Cotton Loom Type

Get Increased Production

Faultless Metallic Anti-Lug Straps are fastened to the picker stick as shown in the illustrations by means of the single right and left hand screw at the back of the picker stick.

It will readily be seen that this arrangement, requiring no screws or screw holes, far from weakening the picker stick, gives it added strength and makes breaking practically impossible.

When a change of work makes readjustment necessary, it can be done very quickly by means of this right and left hand screw.

The simplicity of these Anti-Lug Straps makes it possible to apply and adjust them immediately, with merely a nail or pin to operate the right and left hand screw.

The only wearing part is the cup-shaped socket and the ball at the joint, but these will last for years, for the socket is made of phosphor bronze and the ball of steel.

These straps are guaranteed for three years.

Manufacturers desiring to cut down their expenses on picker sticks, wasted time due to the necessity for repeatedly adjusting the old lug straps and the breaking of picker sticks and the time wasted in replacing them, would do well to write us for our

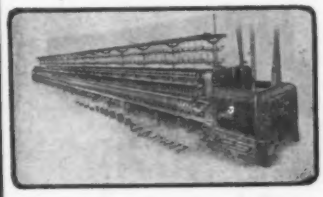
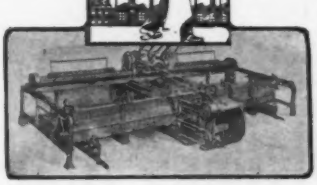
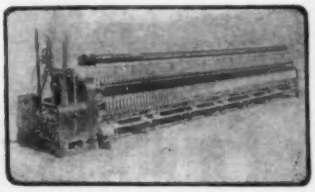
Thirty Days' Free Trial Offer

Whitney & Crockett

Agents for the United States and Canada

184 Summer Street, Room 406 - - - Boston, Mass.

SÆCHSISCHE MASCHINENFABRIK
RICHARD HARTMANN
CHEMNITZ TRADE MARK GERMANY

If a man lights his cigar with a dollar bill, you say he is mentally disorganized.

If a woman has her pet dog buried in a silver casket, you say she is criminally extravagant.

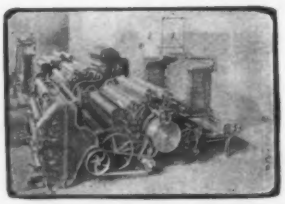
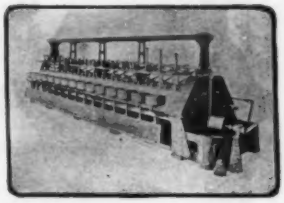
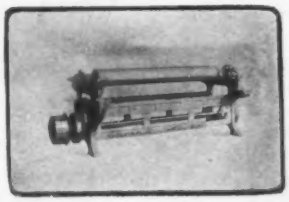
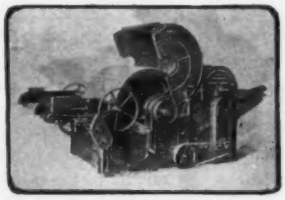
They both
MISUTILIZE
wealth.

If you sell your cotton waste to wipe machines with, or for other purposes, where a less expensive material would do, you say.....NOTHING.

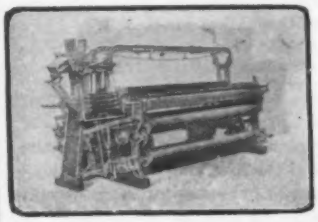
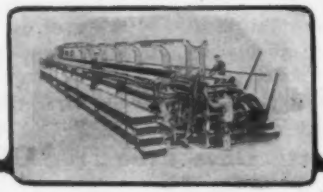
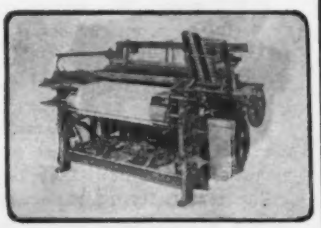
YOU
MISUTILIZE
JUST THE SAME.

Millions of people would welcome a *cheap, serviceable* fabric.

MADE OF COTTON WASTE

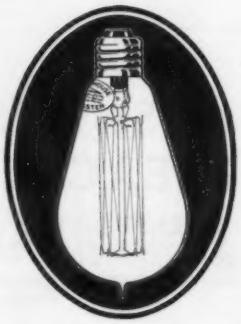
You have the waste
We have the machines
Millions want the fabric

AMERICAN REPRESENTATIVE:

EUGENE SZEPESI, TEXTILE ENGINEER 141 MILK STREET BOSTON, MASS.

Still Greater Economy by using the Tungsten Lamp that stays strong



YOU insist upon tungsten lamps not only for better light, but for economy too. Then get all the economy you are entitled to. Pick out the lamp that you can depend on for long and satisfactory performance—the one that is strong and *stays strong.*

Ask any mill man who has put all kinds of lamps to the life test. He will tell you to look to the Westinghouse Wire Type Tungsten for lasting strength—for ultimate economy.

Westinghouse Wire Type

means not only strength, but strength when needed. You don't care how strong the filament is before it goes into the lamp, or before you put the lamp into service.

What you want is strength while burning—uniform strength during the entire life of the lamp, and that is exactly what Westinghouse Wire Type construction gives you. Wire Type strength is positive. It applies to lamps of all sizes. Begin now to use the lamp that *stays* strong and watch your renewal costs go down.

WESTINGHOUSE ELECTRIC AND MFG. COMPANY

Incandescent Lamp Dept. (Westinghouse Lamp Co.) Bloomfield, N. J.

Darrow-Mann Company

New River Coal Co's

NEW RIVER COAL

(COPY)

SAYLES' BLEACHERIES

SAYLESVILLE, R. I.

Aug. 25, 1911

We beg to give you below results of Fuel Testing Co.'s test of a sample of five cars of Darrow-Mann Co.'s NEW RIVER COAL recently delivered to us.

DRY BASIS

Volatile	Fixed Carbon	Ash	Sulphur	B.T.U.
18.00	78.88	3.12	0.71	15248

We consider this test excellent in every respect, and the coal as "represented is one of the best lots we have ever received."

Yours truly,

SAYLES' BLEACHERIES

Die SMF-M **S. M. Fessenden, Pur. Agt.**

(COPY)

ARTHUR D. LITTLE
(Inc.)

Chemists and Engineers

93 Broad Street

COAL CERTIFICATE

BOSTON June 30, 1911

Sample No. 67584

NEW RIVER COAL delivered at Stetson Coal Co. wharf by barge "Dora."
Sampled by our agent June 27, 1911.
For DARROW-MANN CO.

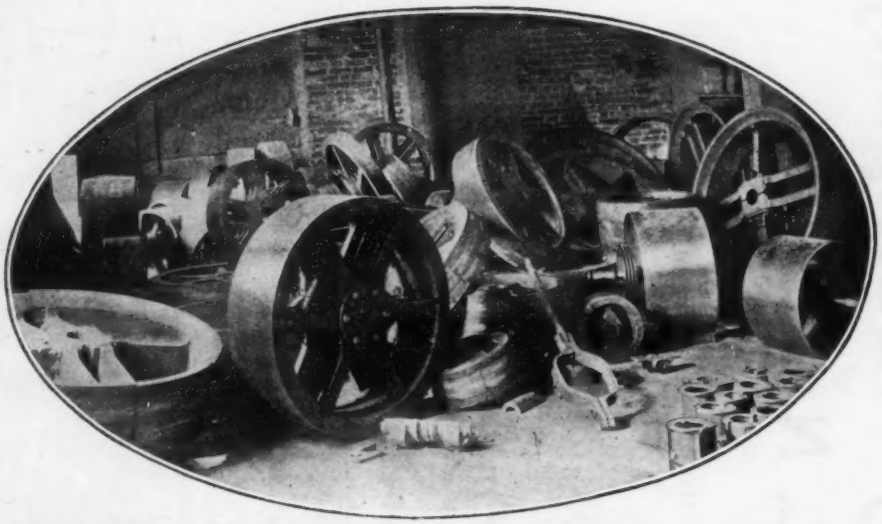
DRY BASIS

Volatile	Fixed Carbon	Ash	Sulphur	B.T.U.
16.99	79 16	3.85	0.59	15220

ARTHUR D. LITTLE, Inc.

(Signed) **Carl F. Woods**
Secretary

THE MARSHALL BUILDING, 40 CENTRAL STREET
BOSTON, - - MASS.



PROFIT BY ANOTHER'S EXPERIENCE

Save power, space and cost of unnecessary equipment by driving your machines with motors and

"MAXIMUM" SILENT CHAIN

"Maximum" Silent Chain

The illustration at the top shows only a part of the pulleys taken out of one room of a textile mill, when "Maximum" Silent Chain Drives were substituted for leather belt drives.

The story of economy resulting from the use of "Maximum" Silent Chain is told in our new 32-page book on chain driving in Textile Mills.

Every Textile Manufacturer will profit by reading it. Sent free.

Just write for Book No. 115 BB.

LINK-BELT COMPANY

PHILADELPHIA CHICAGO INDIANAPOLIS

BOSTON, 131 State Street

Standard Bleachery Company

CARLTON HILL, N. J.

With our enormous facilities we are able to meet all demands promptly.

Piece Mercerizing. ***Bleaching, Dyeing and Finishing.***

Fine Cotton Goods and Embroideries.

CAPACITY 600,000 YARDS DAILY

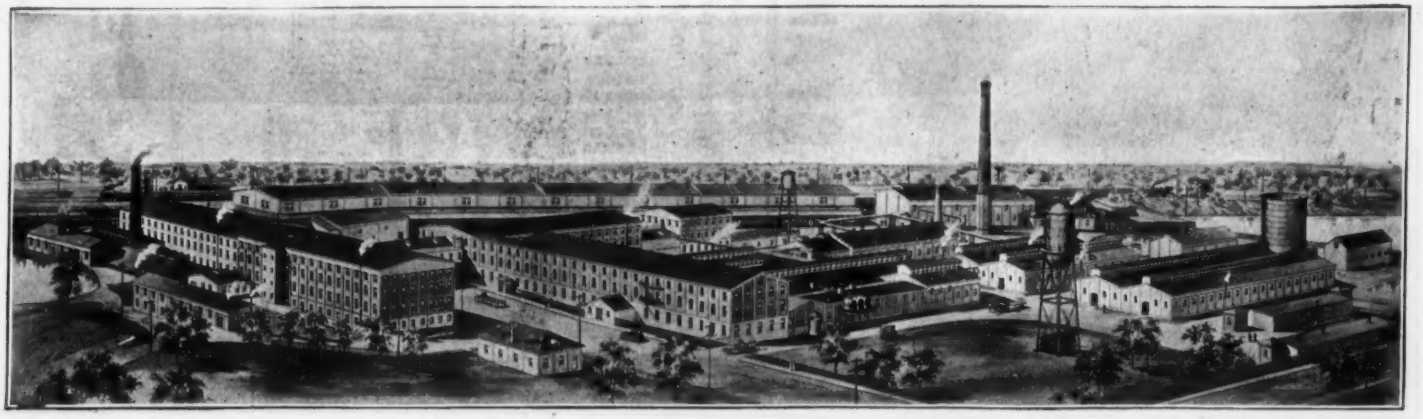


FIG.22.

FIG.39

Lane Canvas Mill Baskets

Light Weight, Smooth
Moderate First Cost
Great Durability
Lowest Ultimate Cost

CONTRIBUTE MATERIALLY TO ECONOMICAL TEXTILE OPERATION

SEE OUR CATALOGUE No. 42

ORIGINATED AND MANUFACTURED ONLY BY

W. T. LANE & BRO.,

POUGHKEEPSIE, N. Y.

Sold Direct and Through All Leading Mill Supply Houses

FIG.20.

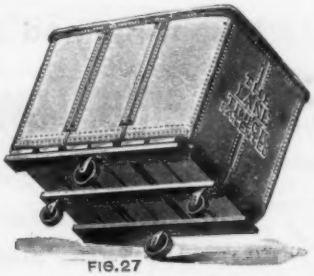


FIG.27

SMITH, DRUM & CO.

"BUILDERS OF THE BEST"

Labor Saving Machinery for Dyeing, Singeing and Finishing

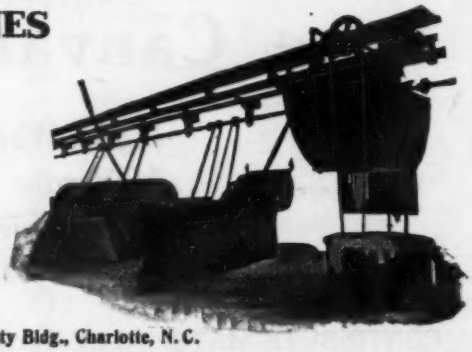
HOSIERY

IN SULPHUR, ANILINE, DEVELOPED BLACKS AND COLORS
POWER SCREW PRESSES and MERCERIZING MACHINES

SAVE LABOR and DYE STUFF and do BETTER WORK in your dye house by using

SMITH, DRUM & CO. MACHINES

Full Particulars on Application



CORAL AND CUMBERLAND STREETS

PHILA., PA.

Southern Agent, H. G. MAYER, Realty Bldg., Charlotte, N. C.

LAWSONS

Hope Foundry, LEEDS, England

BRANCH OF

Fairbairn Lawson Combe Barbour, Ltd.

MAKERS OF MACHINERY FOR

Preparing and Spinning

Flax, Hemp, Tow and Jute

Special Machinery for the Manufacture of Twines, Rope Yarns and Binder Twine

Good's Combined Hackling and Spreading Machine.

Long Reach Screw-Gill Drawing Frames. Chain-Gill Drawing Frames with Apron Heads.

Patent High-Speed Horizontal and Automatic Spinning Frames for Manila.

Improved Laying Machines.

Haskell-Dawes Tubing Twisters.

Brownell's Patent Twisting and Laying Machines for Twine.

N. B.—Complete Plans and Estimates for Flax, Tow, Hemp and Jute Mills, Trawl Twine Factories and Steam Ropeworks.

You cannot get satisfactory results with individual electric motor drive in your mill by using "general service" motors. Individually driven textile machines to operate successfully must be driven by

A Westinghouse Textile Motor-Driven Picker Room

Westinghouse Textile Motors

These motors were planned, designed and built to meet definite and thoroughly understood conditions. For each textile machine there is a Westinghouse Textile motor, specially designed to operate it. To secure maximum results from your machines you must drive them with real textile motors that are suited to the special characteristics of each individual machine. Westinghouse Textile Motors are compact, cool-running, lint and dust-proof, and give the steady, uniform speed so necessary to the operation of most textile machines. Ask our nearest office for specifications on these motors.

Westinghouse Electric & Mfg. Co.

Sales Offices in all Large Cities — East Pittsburg, Pa.

UP TO THE MINUTE

Wool and Worsted Top Dying

IN THE

PSARSKI DYEING MACHINE

PRACTICAL—ECONOMICAL—THOROUGH

UNIFORM COLOR

Dyes Wool and Tops—100 per cent. of Batch—absolutely level color throughout

NO FELTING

The Mass—Dormant While Dyeing—Cannot be Felted. Fibre comes out as Alive—Soft—Elastic and Spinable as it was Before Dyeing

DYES LOOSE WOOL

Acid Colors	2,000 pounds per day
Top Chromed Colors	1,500 " "
Bottom Chromed Colors	1,000 " "

DYES TOPS

Fine Wool	500 pounds per batch
Coarse Wool	800 " "

THREE BATCHES PER ELEVEN HOUR DAY

Tops are packed rapidly and easily. No special system or building. Tops are dyed uniform color throughout

NO FELTING—NO RE-COMBING—NO ADDITIONAL NOILS

SAVES 5 TO 10c PER POUND OVER OTHER MACHINES

SAVES 90 PER CENT. STEAM OVER HAND KETTLE OR REVOLVING MACHINES. SAVES DYES—LABOR—WATER

IS SIMPLE—STRONG—COMPACT—DURABLE—PRACTICALLY NEVER NEEDS REPAIRS

THE PSARSKI DYEING MACHINE COMPANY

3167 Fulton Road :: :: :: :: CLEVELAND, OHIO

JAMES SPEED HARRY STEPHENSON

SPEED & STEPHENSON,

170 Summer Street, Boston, Mass.

Sole Agents in the United States and Canada for

J. B. FARRAR & SONS, HALIFAX, ENGLAND.

WORSTED MACHINERY

Including Gill Boxes, Drawing, Roving, Spinning, Twisting and Yarn Finishing Machinery.

JOHN DAWSON, LTD.,
Wool Washing and Carbonizing Machines.

JAMES SMITH & SON,
Improved Noble Combs and Ball Winders.

DAVID SOWDEN & SONS,
Looms for Men's Wear, Dress Goods, Linings, &c. Improved Dobbys & Jacquard Machines.

WILSON & CO., BARNSLEY, LTD.
High Class Mill Bobbins.

THOMAS BLACKBURN,
Spindle Bands and Tape.

JOHN HETHERINGTON & SONS, LTD.,
Improved Worsted Cards and Mules, Duplex Woolen Cards with Josephy Tape Condensers, to take off up to 240 ends. Improved Woolen Mules, Fearnaughts, etc.

BOLDY & SON, LTD.,
Lister Nip Combs. Hot Air Drying Backwashing Machines, Grease Extracting Plants.

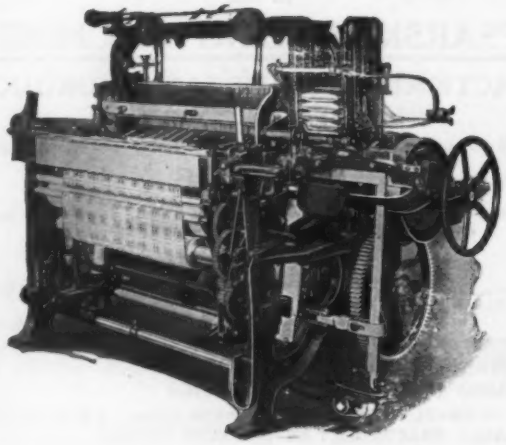
HEARL HEATON & SONS,
Grinding Tackle and Emery Fillet.

S. HALEY & SONS, LTD.,
Card Clothing of Every Description.

MILL SUPPLIES Roller Leather. Combing Aprons. Bristles, and all Supplies used in a Worsted Mill.

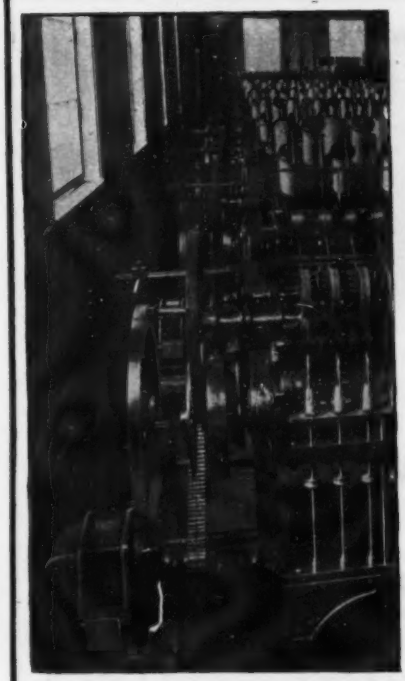
Machine Shop at Lawrence, Mass. For Repairs, Change Gears and Parts.

Crompton & Knowles Automatic Loom



Weave perfect goods and reduce weave room expense.

Crompton & Knowles Loom Works Worcester, Providence Philadelphia



INCREASE YOUR PRODUCTION

BY USING

Morse Flexible Gearing

This form of transmission is **Durable, Silent, Highly Efficient,** provides a **Positive** speed ratio and runs with a **Minimum** amount of care and attention.

The installation of the spinning frame drives shown here **Increased the Production** in this room by keeping the cylinder shafts absolutely up to speed at all times.

The service obtained from these **Morse Silent Chains** was upwards of **12,000 Hours. No other form of Transmission** has ever approached this record in connection with the individual motor equipment.

We now have in successful operation drives transmitting an aggregate of over 500,000 H. P. Individual drives running from 1 H. P. to 2000 H. P. each.

Let us figure on some of your power transmission problems.

Our Bulletin No. 9B is particularly interesting.

MORSE CHAIN CO, Ithaca, N.Y.

N. E. Branch, 141 Milk St., Boston

Cloth Washers, Dye Tubs, Vats, Fulling Mills,
Piece Dyeing Machines, Special Machinery,
Brass Founders, Tanks, To Order.

Hopkins Machine Works, Inc.

BRIDGETON, R. I.

Providence Office, 49 Westminster St.

Spindles and Flyers, for Cotton, Wool, Silk, Flax, etc.

Send for our latest Catalogue and Price List

Dye Tub Valves, Cloth Guides, etc. Bronze or Porcelain Rings.

SPINDLES

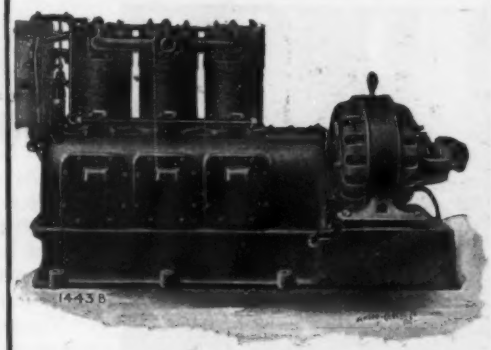
EASTON AND BURNHAM MACHINE CO.

PAWTUCKET, R. I.

J. H. MAYES,

CHARLOTTE, N. C.

Southern Agent.



National Type "3 V S"
Compressor with A. C. Motor and Automatic Control

Have Stood the Test of Time

National Air Compressors represent a practical experience of more than 15 years in designing and manufacturing.

They are a splendid combination of the most essential and desirable features of construction and are built to give steady, consistent service, at the smallest upkeep cost.

The test of time has proven their sterling worth under the hardest conditions and in many fields of industry.

Discriminating textile mills install National Air Compressors because they show the greatest efficiency and reliability in every day hard service.

Their use means ultimate economy.

Built in both stationary and portable types. Equipped with electric or gas motor or belt drive, as desired. Capacities 11 to 300 cu. ft. of free air per minute.

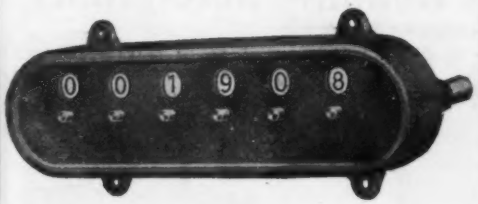
Write for Bulletins M87 and M91.

National Brake & Electric Co.

Milwaukee, Wisconsin

New York . . . . . 111 Broadway
Chicago 1344 First National Bank Building
St. Louis . . . . 405 Security Building
Pittsburg . . . 9th and Penn Avenue
London, England, . 14 Great Smith Street

The Root Linear Counter



This Counter is used on Looms, Balling Machines, Twisters, Dressers, Folders, Printing Machines, Rolling Machines, Tenter Frames, Warpers, Slashers, etc.

Here Are 10 of the Many Ways It Can Help You—

COUNT THEM

It tells you the capacity of any machine.
It tells you what your employees are doing.
It registers the output of any machine exactly.
It can be connected to count almost any kind of units desired.
It insures sufficient production.
It prevents over-production.
It prevents waste of raw material.
It makes the figuring of cost estimates easy.
It prevents waste of time.
It prevents waste of money.

The Root Linear Counter is extensively used in the textile industry, saving money in many textile mills, and can effect economy for you. If you have a counting problem let us help you solve it.

Write for Catalog No. 18

The C. J. Root Company

Bristol, Conn.

Main Drives

IN equipping a factory, large or small, there is no one detail that should be given more careful attention than the main belt drives. The measure of a factory's entire output depends on this. A poor drive will lose for its owner more money in lost power, reduced output of machines, etc., than can be saved by the purchase of a dozen cheap belts.

Harrington Emerson, foremost authority, says that tests in the Santa Fe Railroad Shops proved that the yearly maintenance cost of the best belting was 14% of its first cost, while with belting bought on price, it was 100% of its first cost.

True economy is secured by the use of

Cocheco Belting

for main drive work. It is heaviest and best in stock, workmanship and all. Let us quote you next time.

I. B. WILLIAMS & SONS

DOVER, N. H.

72 Murray Street NEW YORK
157 Summer Street BOSTON
122 Franklin Street CHICAGO

WE MANUFACTURE TOOLS THAT TURN OUT QUALITY AS WELL AS QUANTITY. EFFICIENCY AND ACCURACY ARE A PART OF THE COMPOSITION WITH WHICH

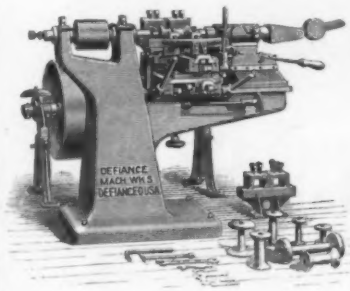
"DEFIANCE" SPOOL and BOBBIN MACHINERY

IS EQUIPPED. TRY THEM AND SEE.

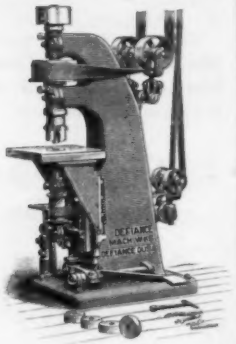
Single machines or complete equipments for producing Hubs, Spokes, Rims, Wagon, Carriage, Automobile and Heavy Auto Truck Wheels, Shafts, Poles, Neck Yokes, Singletrees, Hoops, Handles.

Insulator Pins, Chair and Table Legs, Balusters, Newel Posts, Golf and Hockey Sticks, Gun Stocks, Oval Wood Dishes and for GENERAL WOODWORK.

Bobbin Grooving Machine



Spool Turning Lathe



Spool and Bobbin Disc Cutting and Boring Machine

Designed, Patented, Built and Guaranteed by

THE DEFIANCE MACHINE WORKS

Defiance, Ohio

Write for Catalog and Prices

"BETTER THAN DAYLIGHT"

COOPER HEWITT LAMP

Raise the Efficiency Increase the Production and Conserve the Eye-sight Of Your Employees

In present day economy in textile mill management there is probably no other one single factor which is receiving such careful attention as illumination.

The best man in your mill cannot do the best that is in him unless he is provided with the best illumination.

Throughout the textile industry there are so many installations of COOPER-HEWITT LAMPS that you may be very sure that it will be no waste of your time to investigate its superiorities over all other forms of illumination.

Write our Illuminating Engineering Department for such details as will appeal to you as engineer or manager for making a trial installation.

Remember Light is cheaper than Labor.

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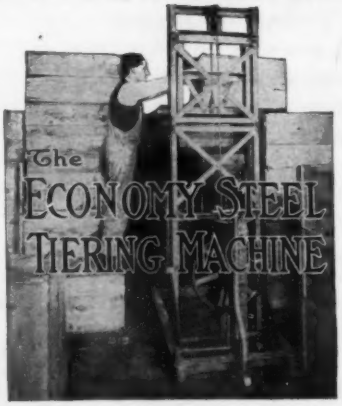

NOTE how this man handles these 500 lb. cases. Could he pile them up alone without the machine? Doesn't this remind you of conditions in your own plant? If so, write us.

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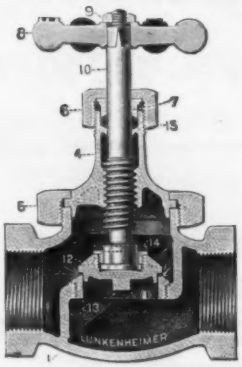

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Are positively the most durable and practical made. The ***seating surfaces can be reground*** and ***all parts subjected to wear can be renewed:*** including the ***Disc*** and ***Seat.*** The ***seat is self-cleansing*** and is made of a hard close-grained nickel. The bronze used in the body and other trimmings contains a high percentage of copper and tin. The improved construction of the disc ***preserves the seating faces and prevents water hammer.***

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are made in two patterns, medium and extra heavy, guaranteed for working pressures up to 200 and 300 pounds per square inch respectively. They are furnished in sizes ranging from ¼ to 3 inches inclusive.

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98% Recuperation.

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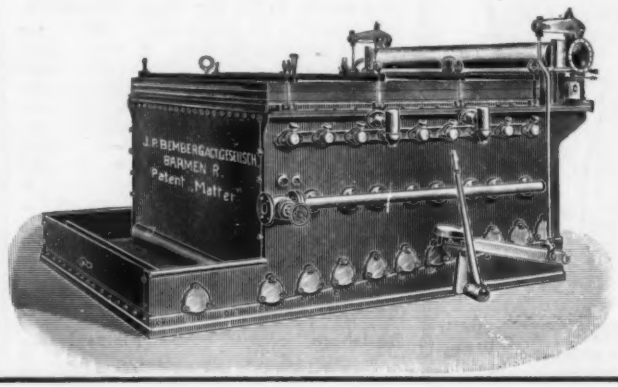
For the economical washing out of acids or salts.



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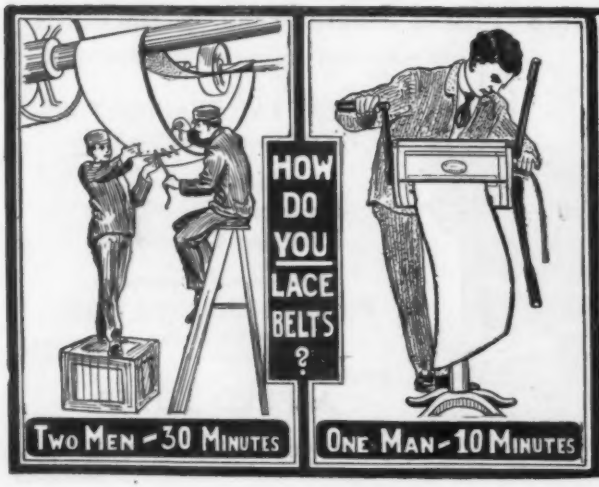

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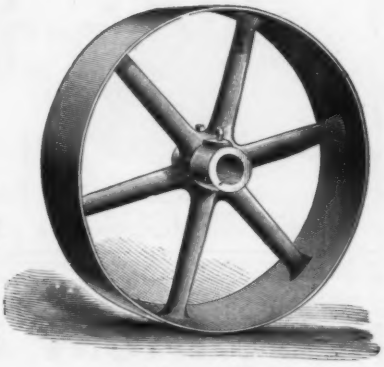

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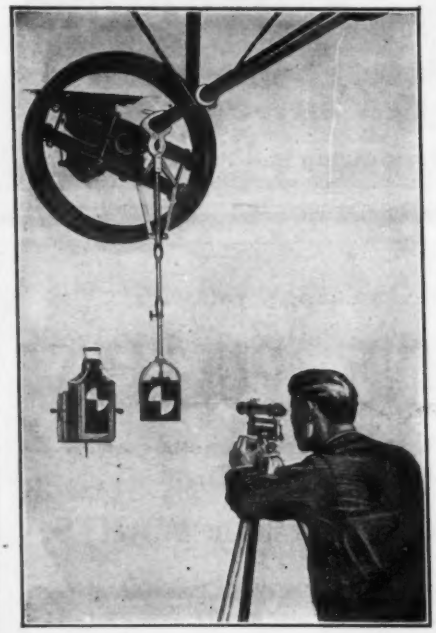

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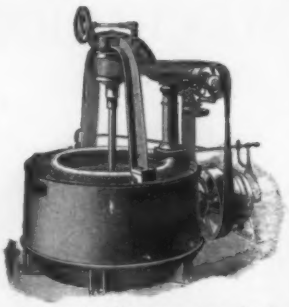

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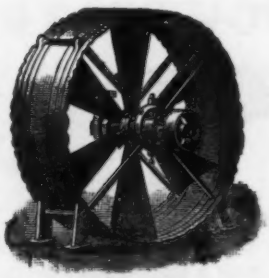

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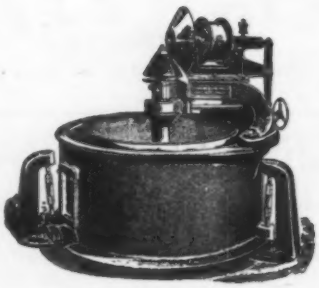

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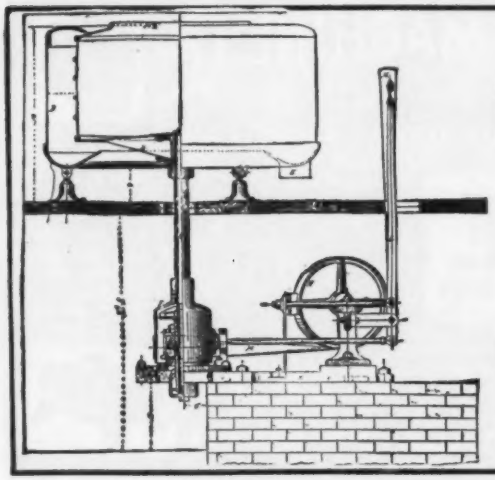

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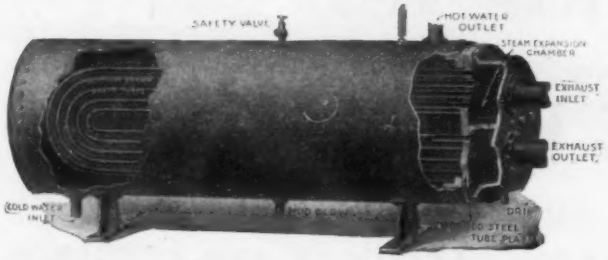

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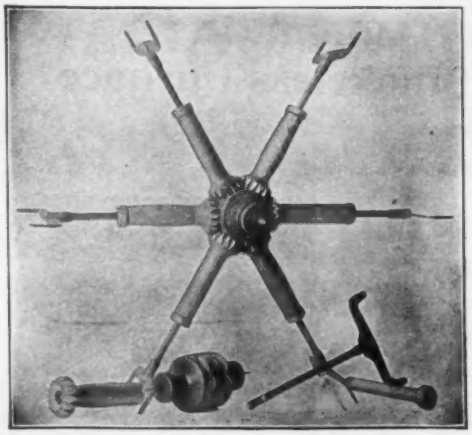

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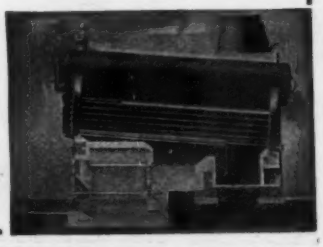

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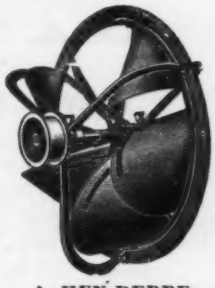
This is our Berry Wheel, e most effective agent on the market for drying and for eliminating steam and other impurities in the atmosphere.



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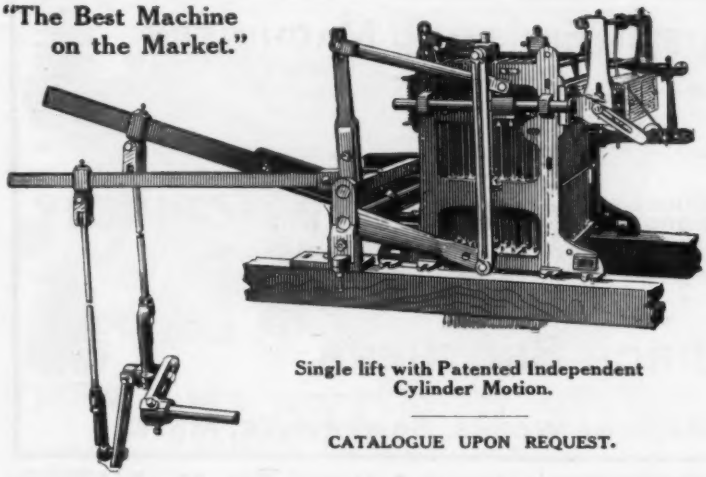

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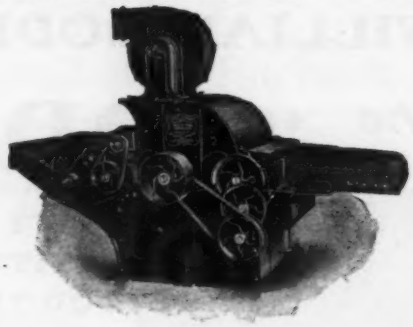

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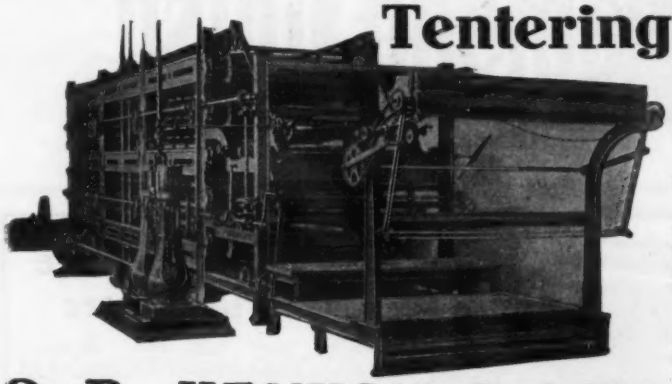

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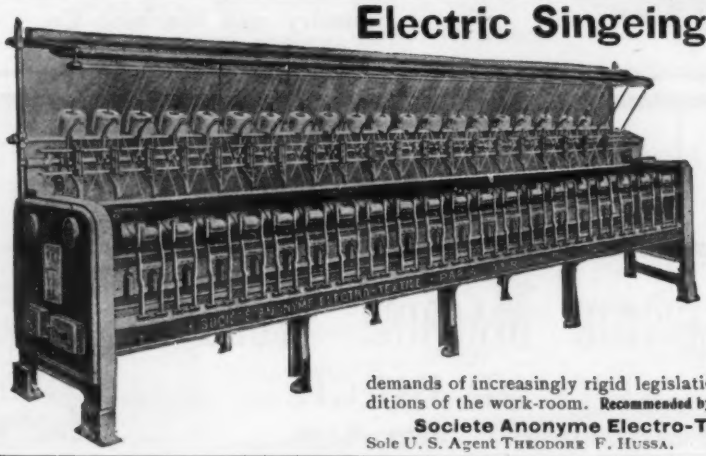

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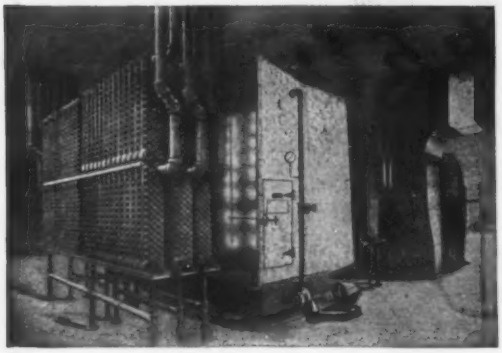

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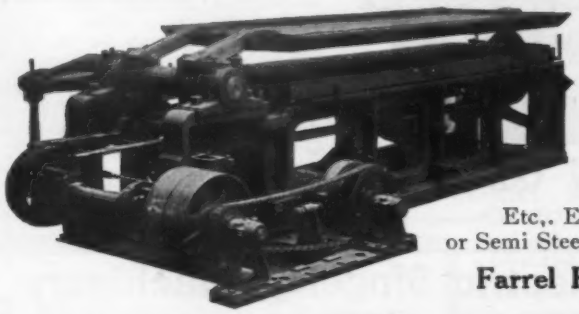

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We have adopted for our belting an additional distinctive mark, which consists of a green edge stripe painted upon one edge of the belting.

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Its Meaning To The Cotton Industry

¶ With all the great progress manufacturers have made in elevating the quality and tone of cotton fabrics in various branches of spinning, designing, weaving and finishing, they have labored under the great drawback to the harmony of this progress on account of the lack of fast colors for the general dyeing of cotton.

¶ In former times the cotton goods were the cheap goods and were not patronized by people of "tone." They were looked upon as coarse fabrics suitable only for the lower classes.

¶ We easily realize this when we consider that the cotton industry is really only about a century old and that the progress and development of spinning fine yarn, and weaving of fine fabrics is necessarily slow. The manufacture by the Badische Company of Indanthrene fast colors has given the cotton manufacturer the one quality heretofore lacking to complete the perfection of cotton fabrics.

¶ To-day the best dressed men and women and those who must be considered as requiring "tone" in their apparel wear numerous articles of colored cotton. In this connection it may be stated that cotton has actually encroached upon the domain of that regal texture, silk.

¶ The completeness of the conquest of colored cotton goods in the world's best trade has been given its final touch by the discovery and use of Indanthrene.

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TEXTILE WORLD RECORD

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Not An Experiment

But in continuous use by the leading bleacheries for years.

DANKER & MARSTON

247 Atlantic Avenue **Boston, Mass.**

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Correspondence

We solicit correspondence on textile subjects. Articles accepted will be paid for. Name and address must always be given, not necessarily for publication. Subscribers are invited to make free use of our Questions and Answers Department; correspondence is strictly confidential.

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The object of this appliance is to remove motes, leaf, short fibre and foreign substances from the cotton, before it reaches the Cylinders and Flats.

This naturally increases the life of the Card Clothing, as it is not being subjected to as rough usage as would be the case if the substances removed by the Duplex Device were allowed to pass on to the Cylinders and Flats, besides which, the Clothing is at all times in much better condition to give superior Carding, and requires much less Grinding.

The quality of the Carding is very much improved by the removal of the objectionable substances referred to, and will produce a much better quality of yarn.

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Production is increased considerably, owing to the cleaner condition of the Cylinder and Flats.

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HARDMAN'S PATENT

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A very good Combed quality can be obtained from Flat Strips by taking out 15 to 20 per cent. at the Comber, and after making allowance for the loss in Carding, a net amount of Combed work of 60 to 65 per cent. is obtained.

WE INVITE YOUR INVESTIGATION.

CLB248372

TEXTILE WORLD RECORD

OCTOBER, 1911

Monthly Comment.

Army Contracts for Woolen Goods

Last month the War Department awarded contracts for carded woolen cloth on the bids submitted July 24, which were reported in our August issue. As much interest was felt in the outcome of this method of awarding contracts, we wrote the Quartermaster General asking for information regarding the new contracts. In his reply, which is given below, he goes into the matter in detail, showing that the results of the departure from previous methods of procedure are very gratifying and promise an even greater measure of success in the future:

Office of the Quartermaster General,
Washington, Sept. 22, 1911.

Mr. Samuel S. Dale, Editor, Textile World Record, Boston, Mass.

Sir:—I am directed by the Quartermaster General to acknowledge the receipt of your letter of the 16th instant requesting information concerning the woolen fabrics for which contracts were recently awarded.

In reply you are respectfully informed that on May 24th a circular was issued by this Department for the purchase of olive drab woolens to be used in the uniform of the Army in lieu of worsteds, which had been used for the past nine years. This circular called for

50,000 yds. 22-oz.
75,000 yds. 16-oz.
50,000 yds. Bedford cord,
175,000 yds. 13-oz.

all to be Melton finish, strictly three-eighths (3/8) blood, 54 to 56 inches wide and conforming in color to the present standards. This circular was sent to nearly all the mills in this country and given considerable notice by the newspapers, so that when the bids were opened on July 24th at Philadelphia for supplying these various fabrics there were sixty odd samples received, representing seventeen (17) bidders.

With the idea of obtaining as much competition as possible and permitting as many manufacturers to enter into competition for these fabrics, no definite specifications were given except the general specifications stated above. There was nothing unusual in this procedure, the idea being to permit manufacturers to use their discretion and combine the warp and filling threads and manufacture such fabric as they thought would be suitable and serviceable for the Army and at the same time easily be manufactured by any woolen mills that might choose to make them in the future.

The Department for some time had been of the opinion that the use of worsted fabrics was very expensive and that by changing to woolens a suitable and satisfactory fabric could be obtained at a considerable lower cost. This had been under consideration for some time and the first samples submitted were made by a well known mill in New York State in the spring of 1909. These were not deemed exactly suitable and the matter was not taken up again until this spring.

After the bids had been opened, a Board of Officers assisted by experts of the Deparment, examined all the samples at the Philadelphia Depot. This examination was carefully and critically made with the result that of the 65 samples submitted about 60 of them were eliminated, the successful bidders being the following:

Germania Mills, Holyoke, Mass., 165,000 yds. 13-oz. at $ .96 3/4 and $ .99.

Henry C. Kent, Clifton Heights, Pa., 10,000 yds. 13-oz. at $ .97; 22,750 yds. 16-oz. at $1.15 and $1.17; 10,000 yds. 22-oz. at $1.37 and $1.43.

American Woolen Co., Boston, Mass., 90,000 yds. 16-oz. at $1.18.

Ricketts & Shaw, Monson, Mass., 30,000 yds. 22-

oz. at $1.39 1/4 and $1.41 1/2.
Arthur D. Ellis, Monson, Mass., 10,000 yds. 22-oz. at $1.40.

The examination of these samples consumed about ten days, being tested for strength, examined for warp and filling counts, weave, etc. By a process of elimination the best samples were selected; all points being considered.

The conditions under which bids were invited in this case and the fact that no absolute standard had been adopted to govern, an expression from the various manufacturers was obtained as to the different fabrics that could be manufactured by them and it is believed that this resulted in the Department obtaining the best fabrics for the lowest value.

It is estimated that a saving of approximately $115,000 has been made by the purchase of woolens. This, however, is understood not to have been wholly due to the change from worsteds to woolens, but due also to the change in the wool market, permitting a lower price in raw stock than at which contracts were last let.

It is understood that some criticism has been directed against the Department in view of the rejection at the opening of July 24th of bids based on olive drab worsteds. While the price of the worsted fabrics offered were low as compared to former prices, it is believed that the quotations were based on the desire to dispose of certain stock on hand and not based on actual cost of manufacture at this time. The advertisement called for woolens, consequently worsteds could not be accepted under the terms thereof.

Five samples of Bedford cord fabrics were submitted, but none of them were considered suitable for military purposes. It is believed, however, that the mills submitting samples offered their best product, but this fabric being used so little in the commercial market, and the short time available for experimental purposes necessary to produce a suitable fabric in the weight, tended to eliminate it from consideration.

It was the intention of the Department to use this fabric for riding breeches only. By using the 16-oz. melton and having the reinforce at the knee and seat, it is believed, breeches so made will serve the purpose entirely as well and reduce the number of items carried in stock.

The Department is well pleased with the number of bidders and also the large number of samples submitted, evidencing considerable interest on the part of manufacturers.

There will be prepared very soon specifications covering these fabrics, and standard samples will be selected from the deliveries as a guide for future openings. Bidders at that time will not have to undergo the large expense of submitting 20-yard samples, but will be permitted to bid on the specifications and the newly adopted standards. Wider competition is expected under this arrangement and it is believed that more mills in the future will be successful in securing Army contracts than in the past.

It is impossible to furnish you with small swatches of samples submitted at the opening of July 24th, 1911, but should you so desire, they can be seen at this office. Any further information with reference to this subject compatible with the interests of the Department, will be gladly furnished you.

Respectfully,
J. L. DeWitt,
Captain & Quartermaster, U. S. Army.

The Count of Yarn in Woven Goods

Two methods of determining the count of yarn in woven fabrics are given by William Myers, chief lecturer on textiles at the Manchester (Eng.) Municipal School of Technology, in his article, "The Examination and Testing of Cloth," which appears in the Journal of the Manchester School of Technology for 1911 and which was also presented as a paper at the cotton manufacturers' convention last month. Both methods involve the raveling of the yarn, which is then stretched to bring it to the spun length. By the first method the yarn is then cut into lengths of 4.32 inches or multiples thereof, and weighed, the number of grains indicating the cotton count. By the second method the yarn after being raveled and stretched is cut to given length, and weighed, the count then being determined by calculation or by reference to a previously calculated table or diagram. We think that neither of these methods is equal to the one given in our September issue. Both of the Myers methods are based on the obviously unsound assumption that the analyst can stretch the yarn to the spun length. The operations of finishing, particularly fulling and mercerizing, often change the structure of yarn so as to cause it to break long before it has been stretched from the finished to the spun length, while the loss of weight in finishing wool goods causes a change in the yarn count which the Myers methods do not take into account. Another objection to both of these methods is that, while giving only the yarn count they each require more time and labor than is necessary for determining the weight per yard of cloth, yards per pound, threads per inch and count of yarn by the straight line method, which was explained last month. Mr. Myers has employed the length of 4.32 inches for his first method, but has failed to utilize the useful

relations between this length, the yarn count, the square yard, the pound and the ounce; whereas these relations are utilized in the straight line method for determining not only the yarn count, but also the weight per yard of cloth, yards per pound and threads per inch.

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Good Work Appreciated

The effective work done by the Tariff Committee of the American Cotton Manufacturers' Association in gathering, preparing and publishing the tariff bulletins which so clearly and exhaustively set forth the position of the cotton manufacturers, is largely due to the efforts of a North Carolina manufacturer, Stuart W. Cramer, of Charlotte, whose labors as a member of that Committee were untiring.

At a joint meeting of the tariff committees of the American Cotton Manufacturers' Association, the National Association of Cotton Manufacturers and the Arkwright Club resolutions of thanks to Mr. Cramer were adopted for his services in preparing these tariff bulletins, and other literature and each of these associations individually, through their boards of directors, have taken similar action. It was largely through Mr. Cramer's efforts that the cooperation of Northern and Southern cotton spinners has been brought about, and the effect of this is bound to be far reaching.

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A Textile Machinery Exhibition for 1912

The third exhibition of textile machinery, mill supplies and general textile products under the auspices of the Textile Exhibitors' Association will be held in conjunction with the annual meeting of the National Association of Cotton Manufacturers in Mechanics Building, Boston, April 22d to 27th, 1912. The manufacturers' meeting will be held in the building during the week of the exhibition.

As in the case of the two preceding exhibitions, the management will be in the hands of Chester I. Campbell, Secretary, 5 Park Square, Boston. The exhibition committee consists of F. H. Bishop, of the Universal Winding Co., president of the Exhibitors' Association, H. W. Butterworth, of H. W. Butterworth & Sons Co., Philadelphia, the vice-president of the association, E. F. Hathaway, of the American Warp Drawing Machine Co., M. H. Merrill, of the Allis-Chalmers Co., F. B. Comins, of the American Moistening Co., and L. E. Tracey, of the L. E. Tracey Co.

Invitations have also been extended to the American Cotton Manufacturers' Association and to the Knit Goods Manufacturers' Association to hold their annual meetings in Mechanics Building during the exhibit, as guests of the Textile Exhibitors' Association, as well as to the National Association of Cotton Manufacturers.

Literature containing diagrams, regulations and all the details which would naturally be desired by intending exhibitors, has been prepared and may be had upon application to the secretary.

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Egyptian Cotton

Two officials of the Egyptian government, A. T. McKillop and W. Lawrence Balls, recently had a conference with the Council of the British Cotton Growing Association and gave much valuable information regarding the Egyptian cotton crop. The chairman of the Council also read a letter from Gerald Dudgeon, director of the Egyptian Department of Agriculture, who referred as follows to the mixing of Afifi and Ashmouni cotton.

> The cause of the complaint would disappear to a large extent during the coming year, as the price of Ashmouni was so nearly approaching the price of Afifi that it would scarcely pay the dishonest ginner to adulterate.

The director referred to other influences affecting the Egyptian crop, this part of his letter being reported as follows:

> The diminution of the weight produced per feddan in Egypt was accounted for by the fact that a great deal of land had been reclaimed in the neighborhood of the lakes in the north, and upon this land, which was inefficiently drained and still remained somewhat salt, cotton was being planted in very poor rotation. Another cause was undoubtedly the fact that cultivators had found cotton such a paying crop that, instead of planting it in a triennial rotation as formerly, they now planted it bienially. The principle upon which the

greater part of the cotton was sown in the Delta was that of closer planting than formerly, the contention being that the more cotton plants to the feddan the more cotton was produced. This was quite contrary to experience, the yield being sensibly reduced by approximation, owing to the exhaustion of the soil and the inability of the sun and air to reach the plants. These were the primary causes of the shortage in crop per feddan. The secondary cause was the increase of the cotton worm and boll worm, due to close and more frequent planting. As to the attack of cotton worm which they had just been fighting all over Egypt, the department had now got the first attack under control with a loss of from 1 to 20 per cent. of the crop in different provinces. Upper Egypt was free, and the Fayoum was only slightly affected. The area under cultivation in 1911 had increased by 68,618 feddan (a feddan is 1.038 of an acre), being given at 1,711,288 feddans, against 1,642,610. Much more fine cotton had been planted in Lower Egypt, Afifi representing only 60.65 per cent. of the area against 75.4 per cent. last year.

After the reading of the director's letter came an exchange of views between Mr. McKillop and Mr. Balls and the members of the Council, which is reported as follows:

Among the questions touched on were the suppression of the boll worm, the adulteration of Lower Egyptian cotton with Upper Egyptian, and the means to be taken to ensure a healthy crop by the distribution of pure seed. Mr. McKillop was inclined to believe that the evil of adulteration would be cured automatically by the rise in the price of Ashmouni cotton. As it was, the practice was only resorted to systematically in one place, and it was not sufficiently extensive to explain complaints about Egyptian cotton generally. If it were thought necessary to take Government action to put it down it would probably mean stopping unginned cotton from Upper Egypt passing a certain point on the Nile or on the railways. The chairman and several members of the council expressed the opinion that it might be necessary to do this, as the prices of Upper Egyptian and Lower Egyptian cotton might vary again in the future, and the practice might again become profitable.

As to the distribution of pure seed, Mr. McKillop explained that one of the chief things the department hopes to do is to control the supply of seed to the smaller cultivator. Out of 1,300,000 cultivators 1,200,000 have less than five acres, and it is the smaller cultivators who use bad seed. During the last season the department experimented in one province by distributing the best seed to the smaller cultivators, and they hope to repeat the experiment on a larger scale in every province.

Mr. Hutton said that in all the new countries in which the British Cotton Growing Association are working they had urged that the Government ought to control the distribution of the seed to the cultivators. Government control was absolutely necessary when they were dealing with ignorant cultivators.

Mr. McKillop and Mr. Balls described the steps the Egyptian Government had taken, and hope to take, for the suppression of the boll worm, a pest which is by no means easy to eradicate. Mr. Balls also gave a short address on the scientific aspects of cotton cultivation. By means of the establishment of a research laboratory and experimental farms he looks forward to the production of a seed which will produce a larger crop at an earlier date.

The much-debated question of the supposed water-logging of the Delta was only touched upon, Mr. McKillop explaining that the matter was at present under the consideration of the Government. He expressed the opinion, however, based on what has been done elsewhere, that even if it should be proved that the water table has risen it will not be a very difficult matter to put it right, though, of course, it will involve very heavy capital expenditure.

THE SILK NOIL TRADE

By Our Special Correspondent

Bradford, Eng., Sept. 21, 1911.

The United States Treasury decision imposing a duty of 35 cents per pound on silk noils has caused an immediate suspension of shipments. Shippers were warned by cable to hold deliveries back pending an appeal and in the light of past experience they are not inclined to think that the decision will remain long unreversed. The shipments specifically affected are deliveries of long tussah noils of which the whole production for this year is under contract for the account of American manufacturers.

These noils are the product principally of the various mills in Brighouse (Yorkshire) and their genesis may be briefly traced. The silk worms producing the tussah silk from which these noils come are reared in Manchuria and Northern China where the cocoons are reeled. The waste from the filatures and hand-reeling factories is collected and sold through Shanghai. It is bought by English spinners, largely for making plush yarns, and an important part of the production of this yarn is sold to the United States. The waste is boiled-off, to discharge the gum, opened and passed through flat dressing machines. The dressing produces drafts of long fiber numbered and known as 1st, 2d, 3d and 4th, with shorter drafts which are commonly put together and sold as "shorts." The noils are stripped from the teeth of the

combs and are a by-product of the same order as wool noils or cotton strips.

The first four drafts, mixed in varying proportion according to the quality of the yarn to be spun, are put into laps and drawn and spun upon worsted machinery. The shorts are carded and mule-spun by the so-called "short" or "patent" spun silk waste spinners. The latter class of spinners also buy long noils for the purpose of recombing them, extracting the long fiber to spin with their "shorts" and disposing of the short or "exhaust" noil for other purposes. The division is substantially the same as between worsted and woolen, with the difference that short-spinning of silk in England is conducted on a small scale. Exhaust noils, white or tussah, like the schappe noils manufactured at Manningham Mills or imported from the Continent, are used by woolen manufacturers and by makers of sponge cloths. Long noils are used to some extent also to make noil yarn, an article not usually finer than 20s counts, which has a certain use in making stripings for cheap tweeds.

The silk noil trade is a fickle and inconstant one and prices move over a very wide range. The production is steady and may amount to some 25 or 30 per cent. of the boiled-off weight of all the waste used by the long-spinners. The noils are bulky and soon fill the warehouses when there is no Continental or American demand from the silk or woolen trades. There have been times when long tussah noils, none contracted to America at prices ranging up to 29 cents, have been worth no more than six or seven cents. Possibly they would fall back to some such figure were the American demand removed. Only American bids sustain the prices current at present and in the absence of such temporary demand as now exists a 35-cent duty means an impost of 400 to 500 per cent. ad valorem.

The market in silk noils is a small one and dealings are largely in the hands of merchants who supply spinners with Asiatic waste or buy yarns from them. In stagnant times both spinners and dealers accumulate large quantities of noils and stocks of white noils are considerable at present. Of long tussah noils every pound that could be produced during the remainder of this year has long been sold.

BRITISH ARMY WOOLENS

BY REGENT

Like most of the armies of the world, the British army is clothed in little else than carded woolen. Worsted cloth is bought for such special purposes as nurses' cloaks. Some worsted is used for linings and worsted warps are crossed with woolen filling in certain serges, but woolens form by far the greater part o all the uniforms issued to the British Government services. The contracts for supply are open to the competition of all the manufacturers whose names are on the official list; which is nearly equivalent to saying all manufacturers whatsoever. Anyone who can supply the names of two well-known firms or public authorities as references and satisfy the authorities that he is a manufacturer of the goods in question may have his name inscribed and he then receives periodical invitations to tender. For gross misconduct in connection with contracts, e. g., for swindling or for corrupt practices, a manufacturer's name may be struck off the list. Otherwise there is no serious obstacle to competition and in point of fact the army and navy textile contracts are keenly, and sometimes savagely, competed for. In terms of the Fair Wages Resolution of the House of Commons, contractors have to agree to pay the recognized standard wages of the district and contractors are sometimes reminded of this obligation by questions put by labor members in Parliament.

When the Royal Army Clothing Department is preparing to buy, it invites certain selected manufacturers to send in samples to a certain specification. These are subjected to test and the most satisfactory of the lot is adopted as a standard, sealed with the official stamp and placed on exhibition in the Department's pattern room in London. Other portions are sent out to the Chamber of Commerce in those parts of the country where woolen manufacture is carried on and local manufacturers obtain clippings and copies of specifications without troubling to leave home. The nature of these specifica-

tions can best be exhibited by copies of two herewith sent.

ROYAL ARMY CLOTHING DEPARTMENT

Specification No. 7069.

Designation:—Serge Blue No. 2 Thick.
Dye:—Indigo. Supplies to be equal to the pattern in quality of dye and similar in shade and color.
Woven:—Twill.
Width:—56 inches within lists.
Weight per yard of 36 inches:—1 lb., 6 1/2 ozs., to 1 lb., 7 ozs.
Finish:—As pattern.
To be delivered thoroughly dried and shrinkless.
N. B.—This Pattern Tests as follows, viz:
Counts—Threads per half inch.—Warp, 24/5; weft, 24/5.
Tests per Goodbrand & Holland's machine—6 5/8 by 9 in. gauge. 7 inches between clamps.
Strength:—Warp, 350 lbs.; weft, 310 lbs.
Elasticity:—Warp, 2 inches; weft, 2 1/2 inches.

ROYAL ARMY CLOTHING DEPARTMENT

Specification No. 7074.

Designation:—Cloth, Drab Mixture Greatcoat, Waterproofed.
Dye:—Fast dye, equal to the Sealed Pattern.
Woven:—Prunella.
Width:—56 inches.
Weight per yard of 36 inches:—2 lbs., 1 oz., to 2 lbs., 1 1/2 ozs.
Finish:—Balk as pattern. Supplies must be thoroughly shrunk and waterproofed.
To be delivered thoroughly dried and shrinkless.
N. B.—This Pattern Tests as follows, viz:
Counts—Threads per half inch.—Warp, 19; weft, 23.
Tests per Goodbrand & Holland's machine—6 5/8 by 9 in. gauge. 7 inches within clamps.
Strength:—Warp, 280 lbs.; weft, 340 lbs.
Elasticity:—Warp, 3 inches; weft, 4 inches.

It will be observed that they are silent as to the kind of wool that shall be used. Although in one case the nature of the dye is specified, the general requirement is simply "equal to sample."

The authorities reserve the right to inspect materials during manufacture and insist that supplies must be thoroughly dry, clean scoured, free from grease, soap, or any admixture used to lend fictitious weight, substance or firmness to the fabric. Goods other than flannels have all to be London shrunk, and any portion not exceeding 2 per cent. of the delivery may be taken and destroyed for purposes of test. When pieces once rejected are submitted again the manufacturer is supposed to notify the authorities that the goods have been sent in before and the "headings" of the piece have always to be intact. Widths are measured between the selvedges and broad goods more than two inches below the standard are ordinarily rejected. Allowances are enforced for goods not more than two inches too little in width; one-fortieth is deducted for shortage of one inch and one-twentieth for a shortage of two inches. Cloths when manufactured are all sent to London to be passed and impressed with the broad-arrow stamp which indicates that they have become Government property—even though they have to come back again to the manufacturing district to receive a final treatment before being returned to London to be handed over to the Government clothing workshops. The contractor is never allowed to forget that red tape is the prevailing influence in all official transactions.

MEETING OF WOOLEN AND WORSTED OVERSEERS

The National Woolen and Worsted Overseers will hold their twenty-ninth semi-annual meeting at the American House, Boston, Mass., on Saturday, November 18. The committee, composed of Richard J. Hill, Louis M. Allison, Walter Pickford, Jos. Dolan and J. W. Linnehan, met at the American House on Saturday, September 16, to arrange the meeting at the hotel instead of Faneuil Hall, as a great many of the members were very much displeased with the arrangements last year, when the meeting was held at Faneuil Hall and the banquet at the Elk's Home.

The secretary will as usual send a notification to each member of the association and it is hoped that those who intend to attend the banquet will return the postal card stating whether they will be present.

The exports of cotton goods from the United States to the Philippines for the nine months ending March, 1911, is valued at $2,789,030, as compared with $2,478,910 in 1910, and $2,609,338 during 1909.

WOOLEN OVERSEERS OF EASTERN MAINE

The annual convention of the woolen overseers of Eastern Maine was held at the Bay View Hotel, Waterville, Me., Saturday, Sept. 16, about thirty-five being present. The business session opened at 10 o'clock in the forenoon, and was called to order by President Abel Wall of Waterville. The report of the secretary, L. C. Sawyer, of Dover, was read and accepted. Messrs. Leach, White and Burkhart were chosen as members of the committee on credentials. They reported favorably on the names of Warren D. Porter of North Vassalboro and Edward Hunter of Skowhegan, who were accordingly admitted to membership in the association. The report of the treasurer, J. T. Davidson of Guilford, showed that there is now $674.50 in the treasury.

The following officers were elected: President, Fred Muller of Guilford; first vice-president, A. A. Burkhart of Skowhegan; second vice-president, George McRae of North Vassalboro; secretary, A. D. Spaulding of Dover; treasurer, L. C. Sawyer of Dover. The next meeting of the association will be at Bangor on the last Saturday in August, 1912.

At 2 o'clock a banquet was served at the Bay View, with an elaborate menu which was thoroughly enjoyed by all present. After the banquet a group picture was taken on the steps of the city hall, and then the members of the association took in the sights of Waterville and vicinity, before leaving for their homes on the evening trains.

A GROUP OF THE OVERSEERS OF EASTERN MAINE.

The exports of cotton from India in 1910-11 was 183,425,046 pounds, as against 227,364,488 pounds in the previous year.

The shipments of raw silk from the Milan district declined from $17,180,416 in 1909 to $10,948,745 in 1910.

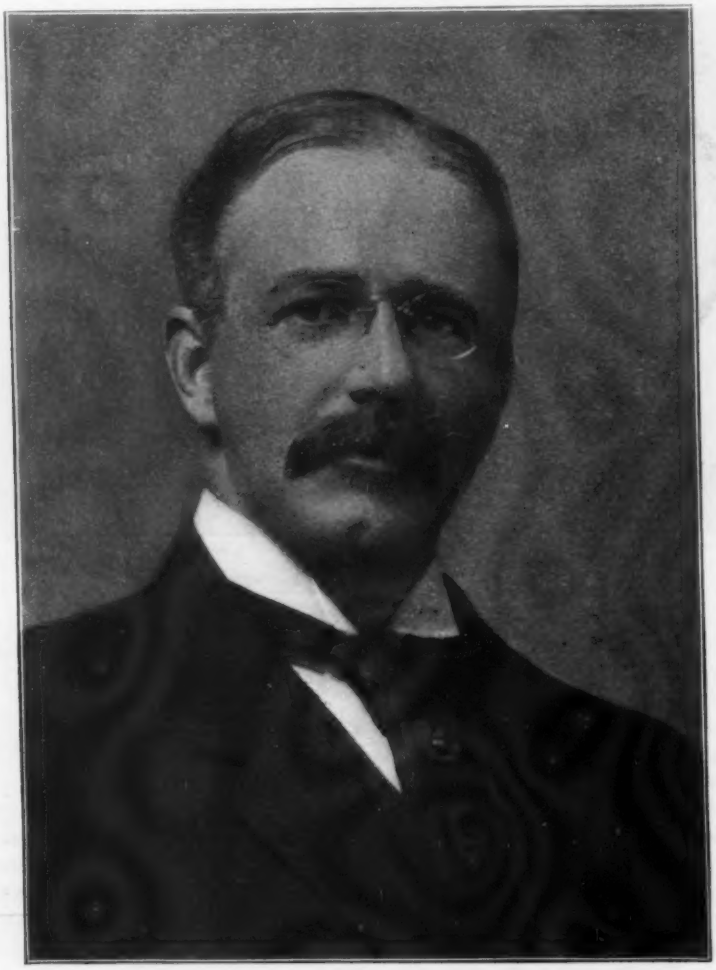
During 1910 the shipments of waste silk from China increased from 4,427,623 to 4,943,943 pounds, and shipments of pierced cocoons decreased from 534,800 pounds to 522,816 pounds.

The United Kingdom sells annually in Turkey upward of 400,000,000 yards of cotton piece goods, valued at about $22,000,000, one-half of which is composed of plain unbleached and bleached cloth. The exportation of cotton goods of all kinds by the United States during 1910 aggregated 295,736,336 yards, valued at $21,271,204.

The Autumn Convention of the National Association of Cotton Manufacturers.

The autumn meeting of the National Association of Cotton Manufacturers was held this year at Manchester, Vermont, the headquarters being the Equinox House.

The social and athletic features are always prominent at the fall meetings, so golf clubs and tennis racquets were in evidence as the party gathered at the special train which left



PRESIDENT FRANKLIN W. HOBBS.

This was the first time the Association had met there, and its reputation as one of the most attractive autumn resorts in New England attracted a large number of members and guests.

Boston on Wednesday noon, September 27. About a hundred and twenty-five made the trip on this special train, which was in charge of the Raymond & Whitcomb Co., whose agents accompanied the excursion

and attended to all the details of travel. Six parlor cars were filled with members and guests, a large number of ladies accompanying their husbands. The route was over the Fitchburg Division, through the Hoosac Tunnel and then through Bennington to Manchester. The picturesque country, with the autumn foliage turning to brilliant colors, made the trip an interesting one. The journey is always a pleasant part of the outing, as it affords an opportunity to renew old acquaintances and make new ones, so that by the time the party arrived at its destination, the sharp edges of formality were pretty well worn off.

A pouring rain storm caused some delay and the party was about an hour late in arriving at the hotel. The first evening session was somewhat behind schedule time in opening on that account and it was after nine o'clock when President Hobbs called the meeting to order and introduced Governor Mead of Vermont, who welcomed the Association to the Green Mountain State. The response to the address of welcome was made by R. M. Miller, Jr., of Charlotte, N. C. Mr. Miller alluded to the fact that cotton manufacturers, both north and south, were working together for the common interests, and that the sectional line which once divided the North and South as rivals was now obliterated and that both sections realized that the interests of each were identical with the other. This was particularly noteworthy in their work together in the common cause of tariff protection to the industry.

President Hobbs' able address was very well received. It touched on points which are of especial interest at the present time. There is much valuable material in the president's address, and his facts and figures on capitalization and stock holdings will be referred to as an authoritative statement on these matters.

Following the president's address, there was an informal reception, with music and dancing, and it was not until a late hour that the party broke up.

Thursday morning dawned bright, clear and cold. The convention business sessions were held in a hall across the street from the hotel, and the members began to gather soon after nine o'clock.

The formal papers delivered at the convention are printed on following pages.

Mr. Henry K. Rowell's paper on the "Organization of the Carding Department in Cotton Mills" aroused discussion. A letter was read from Evan Arthur Leigh, of Boston, taking issue with certain recommendations of Mr. Rowell in regard to the width of cards. Mr. Leigh's letter will be found elsewhere. There was further discussion of this paper by A. F. Bemis, with particular reference to Mr. Rowell's suggestion that only one drawing was necessary or desirable for low counts of yarn, possibly up to 10s to 12s.

Mr. Gulliver's paper on the "Executive Management of the Textile Plant and its Relation to the Market," was read by Secretary Woodbury in Mr. Gulliver's absence.

The paper by Prof. William Meyers, of Manchester, England, concluded the session. There was some discussion of this paper by Mr. Bemis, relative to the methods of making tests. Mr. Bemis referred to the author's criticism of some of the methods of measurement specified in the cotton goods sales notes, and believed that these methods, though they might not be technically the best possible, were the most practical means of establishing a method of width measurement for every day use. Mr. Bemis differed from Prof. Meyer's conclusions in several respects and spoke of the difficulty of securing similar conditions for different tests.

The morning session adjourned early and the party gathered in front of the hotel to be photographed.

The bracing weather made the afternoon out of doors most enjoyable and the golf links and tennis courts were filled, and many of the party took long walks over the hills and about the picturesque old town. The baseball enthusiasts also got together to good purpose.

The first paper at the Thursday evening session was read by Geo. W. Loggie, of Boston, whose paper on the "Alignment of Shafting and Machinery," although a technical subject, held the attention of the audience closely.

In the absence of Dr. Cobb of the U. S. Department of Agriculture, Dr. D. E. Earle, of his staff, read the paper on the "Measuring of the Cotton Staple." A dark-room had been fitted up to give a practical demonstration of the methods employed, and Dr. Earle was kept busy during Thursday and Friday demonstrating the interesting methods.

The last speaker of the evening was Congressman John W. Weeks of Massachusetts, an honorary member of the Association, whose interesting and very clear explanation of the work of the Monetary Commission was greatly appreciated. He spoke extemporaneously, although following generally the lines of the printed paper.

The fourth session on Friday morning was opened by Prof. Sawdon of Cornell University.

This paper aroused very lively discussion. Lawrence Whitcomb, of Boston, took issue with Prof. Sawdon, both as to methods of test and the results arrived at, particularly in regard to tests of pulleys with cork inserts. He presented a series of tests showing different results than those obtained by Prof. Sawdon and thought that the basis of the latter's tests was not such as would insure accurate and conclusive results for practical conditions. Prof. Sawdon replied at some length to Mr. Whitcomb's remarks, and several other gentlemen interested in this technical subject spoke on the question.

The paper by Mr. Newhouse was read by the secretary on account of the former's absence.

The paper of President Neville of the New York Cotton Exchange was awaited with considerable interest by those who remembered the lively debate following ex-President Marsh's paper on a similar topic at Richmond last May.

At the conclusion of the paper, Mr. Neville was asked many questions relative to the methods of the exchange, particularly as to why it would not be possible to make such changes in the methods and contracts as to permit the buyer of cotton futures to get a delivery of the particular grade of cotton that he wanted instead of having to take what was offered him on the basis contract. Mr. Neville explained that it was impossible to determine in advance of harvesting the crop, whether or not the different grades would be in sufficient supply to enable the merchant to enter into such contracts with the buyer; that it would be too great a risk to do so. The discussion was participated in at some length by Messrs. Bemis, Bennett, R. B. Lowe, Chas. T. Plunkett and others.

MEMBERS AND GUESTS AT THE

The last session of the convention on Friday evening was opened with a paper on Cotton Mill Illumination by J. M. Smith.

Mr. Smith's paper was of such a nature and so well delivered as to be of general interest and clearly understood by all.

Edwin H. Marble, who has prepared a

number of interesting papers for the Association, was unable to be present, and his paper was read by the secretary, as was also the paper of A. M. Robertson, giving some interesting historical data on chemical bleaching.

Ballot was then taken for the election of new members. The Committee on Resolutions reported and the following resolutions were unanimously adopted:

Resolved, That we approve of President Taft and the National Administration in the policies which have been followed relating to the public domain, and we urge that Congress shall act without delay in providing such regulations and restrictions as may be applicable to a suitable use of the public territory and the valuable products which go with it, and we especially urge that a broad and enlightened policy may be adopted relating to the Alaskan territory, one which will not prevent its development, but which will open up its great resources in such a way that they may be not only of benefit to the present generation, but as far as possible may be conserved for generations to come; and,

Resolved, That we approve of the administration's policy of internal improvements enlarging and making more useful our rivers and harbors, and we urge that as far as possible the improvement of rivers and water powers connected with them shall be preserved and developed for useful purposes; and,

Resolved, That we approve of and commend the forestry policy recently adopted by Congress, looking to the purchase and protection of forests about the headwaters of navigable streams. Any practical methods used to preserve forests, either public or private, must inure directly or indirectly to all of our people and this should be made one of the permanent policies of our Government.

Resolved, That this association protests against such hasty and unconsidered legislation as that proposed in the Underwood and La Follette bills, wisely vetoed by President Taft. Legislation changing the tariff should only be made after all the facts relating to the duty have been presented and considered. The Tariff Board having been authorized to furnish information, we urge that changes should not be made in any schedule until the information obtained by this board has been submitted to Congress by the President and given consideration. We deny that the industry is overcapitalized, or that the return on the actual capital invested is, or ever has been, excessive, or that there is any trust or combination in any branch of the business. The raw material is few and the widest competition prevails. These questions are fundamental in the industry and should be among the important elements considered whenever changes in the tariff are contemplated.

AUTUMN CONVENTION, EQUINOX HOUSE, MANCHESTER, VT.

Signed by Wm. B. Plunkett, chairman; Harry W. Butterworth, R. M. Miller, Jr., James R. Montgomery and Edward W. Thomas.

The thanks of the association were tendered the tariff committee of the American Cotton Manufacturers' Association for the able, comprehensive and effective work it did in the compilation and distribution of the tariff bulletins. Thanks were also extended to Governor Mead, to the Department of Agriculture for its accomplishments in the improvement of American cotton, to Prof. Emery, to Henry K. Rowell, Prof. Will M. Sawdon, J. M. Smith and A. M. Robertson for papers delivered.

President Hobbs then introduced the principal speaker of the evening, Prof. Henry C. Emery, Chairman of the Tariff Board, who together with Judge Howard, another member of the Board, had come on especially from Washington to meet the manufacturers and tell of the work which was being done by the Board in connection with the cotton industry.

Prof. Emery's address was listened to with marked attention, and his frank statement of the character of the work that was being done by the Board made a favorable impression. An interesting feature was the statement that the investigation would not stop at the costs of manufacturing goods, but that investigations were to extend from the manufacturer through the commission house and jobber to the consumer, so that the cost of goods at different stages of distribution from the mill to the consumer might be ascertained.

THE MAIN STREET, MANCHESTER, SHOWING CONVENTION HEADQUARTERS.

At the conclusion of Prof. Emery's address, the secretary made several announcements, including one relating to the formation of the Textile Base Ball Association. All those connected with the textile and allied interests are eligible, and a cup has been offered by F. L. Babcock of Fibre and Fabric to be contested for each year, and S. H. Steele for the Textile Manufacturers' Journal offered the necessary equipment. L. T. Shurtleff of the Pairpoint Corporation offers a cup to the player having the best general average. Announcement was also made that the committee was considering plans for a tennis tournament for next season, for which events cups were tendered by Chas. T. Plunkett and by Henry G. Lord for the Textile World Record. It was also announced that prizes for a whist tournament for ladies have been offered.

The committee on golf reported that the Board of Government cup for the best gross score had been won by W. H. Plunkett and for the best net score by M. H. Coffin. The Committee's cup for the best gross score was won by T. R. Plunkett and for the best net score by Geo. F. Steele. Many of those who would have participated were unable to do so on account of the heavy downpour of rain on Friday which prevented some of those who had deferred their matches until that day from entering. After the formal exercises the floor was cleared and the good time continued with music and dancing until a late hour.

Saturday brought pleasant weather and sunshine to send the visitors home. The motor parties began to get away early and when the special train pulled out from the Manchester station at nine o'clock for the return journey and the ninety-first meeting of the Association was over.

Much credit for the success of the meeting

is due to President Hobbs, Secretary Woodbury and Chas. T. Plunkett, Chairman of the Committee on the meeting. The details were carefully planned and well executed and the papers read were of an unusually high order. The presence of Congressman Weeks and Prof. Emery and Judge Howard of the Tariff Board gave a special feature to the meeting and their topics being of general interest were entertaining not only to the manufacturers but also to those not specially versed in the strictly technical subjects.

The social features were most enjoyable and this fall meeting makes another strong link in the chain which binds the members and guests together in closer acquaintance and friendship.

The following new members were elected:

NEW MEMBERS ELECTED

Langdon Coffin, president's assistant, Samson Cordage Works, Newton, Mass.

Milton O. Dean, superintendent Dwight Manufacturing Co., Chicopee, Mass.

William A. Erwin, treasurer Erwin Cotton Mills, West Durham, N. C.

Francis W. Fabyan, treasurer Otis Co., Cordis Mills, Columbian Manufacturing Co., Bliss, Fabyan & Co., Boston, Mass.

W. E. Hatch, president New Bedford Textile School, New Bedford, Mass.

Howard S. O. Nichols, assistant treasurer Great Falls Manufacturing Co., Boston, Mass.

Andrew Raeburn, assistant treasurer Harmony Mills, Boston, Mass.

Henry F. Searles, auditor Harmony Mills, Cohoes, N. Y.

Geo. A. Tenney, treasurer Monadnock Mills, Claremont, N. H.

Associate Members

Joel M. Barnes, member firm of Harpman & Barnes Co., Boston, Mass.

Dr. Matthew S. Borden, American Printing Co., New York, N. Y.

Garrett D. Bowne, Jr., commercial engineer, Westinghouse Electric & Manufacturing Co., Boston, Mass.

N. LeRoy Gardner, general manager R. L. Greene Paper Co., Providence, R. I.

William D. Hamerstadt, engineer, Rockwood Manufacturing Co., Indianapolis, Ind.

George W. Neville, president New York Cotton Exchange, member firm of Stephen M. Weld & Co., and of Weld & Neville, New York, N. Y.

The following is a list of those present:

CONNECTICUT

C. B. Burney, Windsor Locks.
J. R. Montgomery, Windsor Locks.
Mrs. J. R. Montgomery, Windsor Locks.
Spencer Montgomery, Windsor Locks.

MAINE

P. N. Dexter, South Berwick.
H. D. Lord, Saco.
James Strang, Biddeford.
C. A. Wakefield, Biddeford.
C. P. Garland, Saco.

MASSACHUSETTS

F. H. Andes, Boston.
F. L. Allen, Readville.
Geo. A. Ayer, Easthampton.
F. L. Babcock, Boston.
A. F. Bemis, Boston.
Frank P. Bennett, Boston.
Mrs. Frank P. Bennett, Boston.
Robert Bishop, Boston.
Mrs. Robert Bishop, Boston.
G. B. Browne, Boston.
A. P. Bryant, Boston.
Fred C. Bryant, Fitchburg.
James Buffington, Fall River.
D. B. Butts, Boston.
Joseph Brierley, Adams.
Robert Burgess, Boston.
Mrs. Robert Burgess, Boston.
C. A. Chase, Boston.
C. H. Clark, Boston.
L. Coffin, Boston.
Melvin H. Coffin, Boston.
James A. Collins, Fall River.
Mrs. John A. Collins, Fall River.
R. H. Craft, Boston.
Geo. P. Grant, Jr., Fitchburg.
S. Harold Greene, Boston.
Albert H. Greene, Lowell.
Mrs. Harold Greene, Boston.
P. H. Gallagher, Boston.
F. W. Howes, Amesbury.
A. H. Hartley, Fall River.
J. H. Havey, Lowell.
Mrs. J. H. Havey, Lowell.
C. W. Hawes, Boston.
Franklin W. Hobbs, Brookline.
Wm. C. Hawes, New Bedford.
Mrs. Wm. C. Hawes, New Bedford.
W. E. Hatch, New Bedford.
Carroll Hutchins, Boston.
E. D. Hague, Boston.
J. B. Jamieson, Newton.
G. F. Jenks, Boston.
Nathaniel B. Kerr, New Bedford.
Mrs. Nathaniel B. Kerr, New Bedford.
George W. Loggie, Boston.
Mrs. George W. Loggie, Boston.
W. W. Crosby, Boston.
James A. Cooper, Whitinsville.
Mrs. James A. Cooper, Whitinsville.
John P. Danker, Boston.
D. J. Danker, Boston.
Rogers W. Davis, Lowell.
Fred N. Dillon, Fitchburg.
C. E. W. Dow, Boston.
Miss Grace L. Durgin, Wollaston.
Howard Emerson, Newton Centre.
Mrs. Howard Emerson, Newton Centre.
G. B. Emmons, Lawrence.
Frederick A. Flather, Lowell.
G. W. Foster, Lowell.
Mrs. G. W. Foster, Lowell.
Wm. Firth, Boston.
Mrs. Wm. Firth, Boston.
W. N. Goddard, Boston.
A. C. Gardner, New Bedford.
H. G. Lord, Boston.
R. B. Lowe, Fitchburg.
E. T. Lyle, Brookline.
Mrs. E. T. Lyle, Brookline.
F. B. Macy, New Bedford.
Mrs. F. B. Macy, New Bedford.
Fred E. Mann, Boston.
Mrs. Fred E. Mann, Boston.
J. P. Marston, Boston.
C. B. Mason, Newton.
T. H. Meek, E. Douglas.
M. H. Merrill, Boston.
M. A. Metcalf, Boston.
Charles M. Mumford, Boston.
Mrs. Charles M. Mumford, Boston.
Wm. R. Noone, Boston.
W. E. Orr, North Adams.
S. B. Paine, Boston.
E. E. Palmer, Boston.
John P. Phelan, Whitinsville.
Theodore R. Plunkett, Adams.
William C. Plunkett, Adams.
W. B. Plunkett, Adams.
Mrs. Wm. C. Plunkett, Adams.
William B. Plunkett, Adams.
C. T. Plunkett, Adams.
C. T. Plunkett, Jr., Adams.
Robert S. Parks, Fitchburg.
Frank B. Perry, Boston.
F. J. Quinn, Amesbury.
Frank W. Reynolds, Boston.
Mrs. Frank W. Reynolds, Boston.
Henry K. Rowell, Boston.
Mrs. Henry K. Rowell, Boston.
Edwin H. Rooney, Whitinsville.
Mrs. Edwin H. Rooney, Whitinsville.
Miss Norma E. Rooney, Whitinsville.
Clifford C. Smith, Leicester.
Mrs. Clifford C. Smith, Leicester.
Ray M. Sanford, Westfield.
Mrs. Ray M. Sanford, Westfield.
L. T. Shurtleff, New Bedford.
Mrs. L. T. Shurtleff, New Bedford.
C. P. Slocum, Boston.
W. F. Smith, Boston.
Abbott P. Smith, New Bedford.
Howard B. Sprague, Lynn.
H. B. Sprague, Lynn.
Mrs. H. B. Sprague, Lynn.
Spencer J. Stein, Boston.
Philip C. Sullivan, Indian Orchard.
G. F. Steele, Boston.
W. I. Stimpson, Hopedale.
Mrs. W. I. Stimpson, Hopedale.
A. K. Searls, Northbridge.
Gay D. Thayer, Worcester.
E. W. Thomas, Lowell.
R. W. Thurston, Fall River.
Mrs. E. W. Thomas, Lowell.
Frank S. Tucker, Boston.
Wm. R. West, New Bedford.
Mrs. Wm. R. West, New Bedford.
Miss E. M. West, New Bedford.
Albert Walton, Lexington.
Mrs. Albert Walton, Lexington.

Charles H. Weare, Jr., Boston.
Joseph W. Webster, New Bedford.
Mrs. Joseph W. Webster, New Bedford.
P. C. Wentworth, New Bedford.
W. S. Williams, Boston.
Mrs. W. S. Williams, Boston.
C. J. H. Woodbury, Lynn.
Mrs. C. J. H. Woodbury, Lynn.
Miss Alice P. Woodbury, Lynn.
Miss Laura B. Woodbury, Lynn.
Miss Louise B. Woodbury, Lynn.
Walter C. Watson, Leicester.
Hon. John W. Weeks, West Newton.
Lawrence Whitcomb, Brookline.
Miss Helen Whitcomb, Brookline.
Paul Whitin, Northbridge.
Mrs. Paul Whitin, Northbridge.
Harry Wylde, Lawrence.
John Wylde, Boston.
C. Minot Weld, Boston.

NEW HAMPSHIRE

C. Cidder, Peterboro.
M. F. Foster, Milford.
Mrs. M. F. Foster, Milford.
Capt. Chas. H. Manning, Manchester.
A. W. Noone, Peterboro.
R. A. S. Reoch, Dover.

NEW JERSEY

Miss Annie Lambert, Summit.
William Lyall, Summit.
W. L. Lyall, Passaic.
Mrs. W. L. Lyall, Passaic.

NEW YORK

J. Frank Andres, New York.
G. B. Bowne, New York.
G. B. Bowne, Jr., New York.
Dr. M. S. Borden, New York.
Wm. H Merriman, Capron.
Mrs. Wm. H. Merriman, Capron.
George W. Neville, New York.
Martin Relyea, Cohoes.
Mrs. Martin Relyea, Cohoes.
H. F. Searles, Cohoes.
V. E. Carroll, New York.
W. S. Bullock, New York.

NORTH CAROLINA

R. M. Miller, Jr., Charlotte.

OHIO

J. M. Smith, Cleveland.

PENNSYLVANIA

H. W. Butterworth, Philadelphia.
Roland Gerry, Pittsburg.
J. S. Kunkle, Philadelphia.
Charles Robbins, Pittsburg.
S. H. Steele, Philadelphia.
Wm. T. Waterman, Philadelphia.

RHODE ISLAND

W. Y. Anthony, Providence.
A. A. Aspinwall, Pawtucket.
F. M. Armstrong, Pawtucket.
Fred Ballou, Providence.
J. W. Baker, Pawtucket.
Mrs. J. W. Baker, Pawtucket.
Theodore P. Rogers, Wickford.
Amos M. Bowen, Providence.
L. W. Campbell, Woonsocket.
Mrs. Chas. R. Cass, Providence.
F. L. Chace, Providence.
Dr. C. B. Christie, River Point.
Henry C. Dexter, Pawtucket.
A. S. Fuller, Providence.
Lymann B. Goff, Pawtucket.
Mrs. Lyman B. Goff, Pawtucket.
D. L. Goff, Pawtucket.
Miss Gardner, Providence.
Wm. H. Harris, Pawtucket.
George C. Hinckley, Valley Falls.
F. W. Howe, Providence.
John E. Kendrick, Providence.
Mrs. John E. Kendrick, Providence.
W. N. Kimball, Woonsocket.
Mrs. John E. Kendrick, Providence.
E. E. Leonard, Pawtucket.
J. W. Manley, Saylesville.
E. C. Martin, Providence.
J. S. Merchant, Providence.
Edward L. Martin, Pawtucket.
Walter T. Phipps, Providence.
E. A. Rusdon, Providence.
Mrs. E. A. Rusdon, Providence.
Albert H. Sawtell, Providence.
Charles M. Sears, Providence.
Harry M. Smith, Providence.
Mrs. Harry M. Smith, Providence.
W. H. Smith, Pawtucket.
Mrs. W. H. Smith, Pawtucket.
John Shambow, Woonsocket.
Mrs. John Shambow, Woonsocket.
E. R. Richardson, Pawtucket.
Alexander S. West, Providence.
Mrs. Alexander S. West, Providence.

VERMONT

Mrs. R. A. Cooke, Burlington.
Harry R. Klugie, Rutland.
Hon. John A. Mead, Montpelier.

WASHINGTON, D. C.

Prof. Henry C. Emery.

PRESIDENT'S ADDRESS

By FRANKLIN W. HOBBS, Brookline, Mass.

Conditions in cotton manufacturing during the past six months have been deplorable. The raw cotton situation and tariff agitation have been the chief causes of the abnormally dull trade we have experienced. The high price of cotton combined with the low price obtainable for goods have forced a great many mills to curtail, as a new dollar could not be obtained for an old one, and added to that condition the uncertainty due to agitation of the tariff, made the sale of products at any price most difficult. Mills have been running short time and it has been estimated that during the past month production, both north and south, has not been 50 per cent. of normal. Crop prospects indicate in the near future cheap and large supplies of raw material, but nevertheless trade lags and there is no feeling of optimism. The stocks of goods are small; the shelves of the jobbers and retailers are exceptionally bare; prices are low; the tariff is settled for a time at any rate, and yet at present the condition of our business continues most unsatisfactory. Where a merchant would ordinarily buy 1,000 pieces of goods he now buys 100 and if further concessions in price were made to increase business they would rather tend to frighten the buyer and make him feel the bottom had not yet been reached.

The fundamental conditions in the country are good, the crops, while not bumpers, are abundant and the financial situation is sound. We now need a cessation of agitation and then confidence will be restored and business resumed in normal proportions. The present may therefore well be the "darkest before the dawn" period, for such depression never has and I believe never can long continue in our country. Let us hope that from now on there will be a gradual, steady improvement in conditions so that in the not distant future our mills may again be busy, our operatives employed at full time and full wages and prosperity reign again in the textile centers of our country, north and south.

CONFERENCE OF COTTON MANUFACTURERS

Reference was made in my last address to a conference of those interested in our industry which was held in Washington, D. C., on February 2, 1911. In order further to cement the friendly relations and spirit of cooperation then referred to, your President and Secretary attended the sessions of the American Cotton Manufacturers' Association which were held in Richmond, Va., on May 18th and 19th, 1911, and we believe that much good will result from similar visits in the future, for our interests are the same, and the closer we can all work together for the common good, the better for all concerned.

A joint meeting of the Tariff Committees of our Association, the American Cotton Manufacturers' Association and the Arkwright Club was held in Washington, D. C., on June 5, 1911, to consider the situation in Congress in regard to the Cotton Schedule of the Tariff. As a result of this conference resolutions were drawn up and signed by all present, protesting against any revision of the tariff until after full and precise information on the subject had been received from the Tariff Board, which had been appointed for that purpose, and also asking the Ways and Means Committee of the House of Representatives to give a hearing, that the manufacturers so vitally interested might have a chance to express their views. This request was denied and the Underwood Bill was drawn up and passed by the House without giving the cotton manufacturers a chance to be heard, a hitherto unknown proceeding. As you know, it was later amended and passed by both

houses of Congress but fortunately for the welfare of the industry and the country at large, President Taft vetoed this hasty and ill-advised legislation which would have caused suffering and ruin to millions of people dependent on a great national industry.

I take this opportunity to congratulate the Tariff Committee of the American Cotton Manufacturers' Association on the thorough and effective work it did in the preparation and distribution of its Tariff Bulletins. It is a matter worthy of special note that for the first time the representatives of the cotton industry in the north and in the south worked harmoniously and effectively together for the common good, and realized at last that as far as our industry is concerned there is "no north, no south, no east, no west."

RULES FOR BUYING AND SELLING COTTON

The cotton brokers and buyers of New England have formed an organization known as the New England Cotton Buyers' Association, its object being to secure uniformity in methods of buying and selling cotton. The Executive Committee of the Arkwright Club, of which all the members but one are members of this Association, held many conferences with a Committee of the Buyers' Association and as a result have approved and recommended for adoption a set of rules called "New England Terms for Buying and Selling Cotton."

Under the new terms all cotton bought or sold will be on the basis of actual weight when received. Heretofore there has been an allowance of three pounds per bale. Tare is to be determined by the actual weight of the first ten bales of each lot of one hundred or proportionate number of bales of other sized lots. This tare will be averaged, the average tare allowed being twenty-four pounds per bale instead of twenty-two previously allowed. The new terms regulate variations from specified grades, allowances for excessive variations, limits of times for deliveries, bases of weights per 100 bales in different sections, rules for claims on weights, grade and staple and insurance rules. The New England Cotton Buyers' Association will employ classers to act when arbitration on claims is necessary.

While there may be some features in these rules which will need amendment after trial, they are a decided improvement over the old haphazard methods, and it is hoped that they will receive the endorsement of all buyers and be given a fair trial.

BILLS OF LADING

A new agreement, intended to safeguard cotton shipping documents, went into effect September 1, 1911. This agreement provided, as in the case of ocean carriers, that export bills of lading should be issued only against physical cotton and not against documents the validity of which was unknown. It also adopted the validation signature certificate and provided for other safeguards against irregularities on the part of the railroads.

The agreement further provided for the establishment of a central bureau where bills will be checked up for the purpose of effectually preventing forgeries. It is hoped that the agreement will satisfactorily adjust the troubles in connection with cotton bills of lading which have existed for so long a time.

The Interstate Commerce Commission also made possible a substantial improvement in handling cotton since last year, by an order which forbade the issuing of cotton bills of lading upon receipts of compressor, stating that the designated quantity had been received. The commission also stopped the misdating of bills and forbade issuing of bills until the cotton is actually on the station platform. It has been suggested that a Federal law be passed, putting all responsibility for cotton bills on the railroads.

CAPITALIZATION OF COTTON MILLS

The question of capitalization of cotton mill properties and dividends paid on the same has been much in the public mind and has called forth various comments from those high in official life in the nation. United States Senator Bristow of Kansas recently said:

"The advances in the cotton schedule have led the manufacturers to over-capitalize enormously, the owners seeking to float more stock because they believed the increased duties on fabrics would enable them to reap larger profits from their mills. But the enormous burden placed upon these enterprises now would seem to be more than they could bear. Many New England mills today are staggering under the load of excessive capitalization, and it is only a question of time until the collapse will come."

Unfortunately such utterances, made by men in the position held by Mr. Bristow, naturally carry much weight with the general public, who know nothing about the subject and who believe everything they see in the newspapers. Those of us who are in the business and familiar with the facts know how utterly unfounded are such statements. It is hard to understand the motive that leads responsible men to make statements like the one quoted when it is so easy to get the facts which prove the situation to be exactly the contrary. A table based on one originally printed in Fibre and Fabric has been prepared showing capital, spindles, capital per spindle, replacement values and under capitalization of New England cotton mills. [Detailed table printed in Official Report.]

From this table it will be seen that the eighty-nine mills in the table are actually capitalized for $100,766,000 and operate 9,477,599 spindles at an average capitalization of $10.63 per spindle. Now let us consider the claim of "excessive capitalization." The figures show that instead of being, as claimed, enormously over-capitalized, the reverse is true and that the actual replacement valuation of these mills is $186,916,934, or an under capitalization of $86,150,634. The average capitalization per spindle is $10.63 against a replacement value of $19.72 per spindle as figured from the table.

The average cost of building cotton mills today, as shown by the result of actual practical experience, is in round numbers for mills of 50,000 spindles, as follows:

Coarse yarn mill all carded work avg. 20s making single yarns $22.50

Coarse yarn mill all carded work avg. 20s making 2 ply yarns	24.00
Coarse cloth mill all carded work avg. 20s common looms	24.50
Coarse cloth mill all carded work avg. 20s Draper looms	26.50
Fine yarn mill all combed work avg. 80s making single yarn	21.00
Fine yarn mill all combed work avg. 80s making 2 ply yarn	23.50
Fine cloth mill all combed work 80s warp and 100s filling common looms	23.50
Fine cloth mill all combed work 80s warp and 100s filling Draper looms	25.50

From the above it will be seen that the average replacement figures taken from the table, namely, $19.72 per spindle, are actually below the figures which experience has proved the latest mills to have cost.

If the mills included in the table, therefore, were capitalized at the replacement values in the table it would be necessary to add to the outstanding capital stock $86,150,634, or in round numbers 85 per centum to the present issues of stock. The facts are, therefore, that instead of being overcapitalized these New England mills are capitalized at about 54 per centum only of their replacement values.

These figures, of course, take no account of quick assets, good will or any other assets other than valuation of plant, while these other assets in many instances are of great additional value. It is, therefore, clearly shown that most of the mills in New England really misrepresent their actual condition, mislead the public and give political agitators a chance to talk, by this unfortunate condition of under-capitalization, and apparently high dividends. The per centum of dividends, unfortunately, catches the public eye and not the actual amount in comparison with the real value of the property. Twelve per centum and 16 per centum dividends sound large, but if the dividends were figured on the real value, the situation would be found quite different. Mill shares in New England, as a whole, pay about 5 per centum only on the replacement values, and replacement values under normal conditions are about market values.

In the early days of the industry it was the custom to build small mills, to make the capital small and gradually to build up the business, even if there were no dividends. The resulting plant, therefore, represents the gradual accumulations of years and the capital now has no proper relation to the actual values. The new mills have been properly capitalized, on a basis of actual cost to build and with reference to these new mills we hear no talk about excessive dividends, for they are conducted, like all modern business, on a capital representing a fair value of the property. It seems to me that this whole subject of capitalization is one that may well receive most careful attention, taking into consideration the true interests of the stockholders and the community at large.

CORPORATIONS AND STOCKHOLDERS

Cotton mills have generally been incorporated for one of two dissimilar reasons.

In order that reliable data might be obtained, letters were sent to many of the cotton mills in New England with the request for the desired information, as it was felt to be a matter of great interest to call attention to the remarkable popular investment that exists in textile shares and to show the widespread interest all classes of people have in the continued prosperity of our textile industries. Owing to agitation and erroneous statements, that have been so freely made to the public during the past few years, the impression has gone abroad that the cotton mills of the country are owned and operated by the wealthy few and that the public at large have no direct interest in their success. Again the facts are so different from the published statements that it is hard to understand how the latter could have been made, unless with malicious purpose.

Reports from 106 mills, all located in New England, supplied the following interesting facts:

Total capital stock	$135,601,000
Stockholders:	
Men	15,851
Women	14,650
Trustees	5,134
Total	35,635
Employes	148,350

It will be noted first that 45 per centum of the stockholders are men, 41 per centum women and 14 per centum are trustees. In other words, 55 per centum of all the stock, or in round numbers the enormous sum of $75,000,000 par value of stock, is owned by or held in trust for women and children dependent on its dividends for their livelihood.

In 37 of the 106 companies a majority of the stockholders were women and in 72 of the companies a majority of the stock was owned by women and trustees. The average holding per stockholder is 38 shares of a par value of $3,800 only, a great contrast to the existing popular opinion that the ownership is in the hands of a few wealthy people. While these companies do not by any means include all the mills, they are representative concerns and the same conditions will be found true in all similar corporations. The textile corporations really give large numbers of people a chance to make individually small investments and in that regard are a great benefit to the community and should be encouraged in all reasonable ways by local, state and national legislation.

Furthermore there are represented in the returns a vast army of 148,350 employes, for each one of whom an investment at par value of $914 has been made, in the capital stock of these mills. It seems to me that this fact is an impressive one. In other words, before employment can be given, an investment in par value of capital stock, in round numbers of $1,000, has been made for every man and woman who is to be employed in a cotton mill or considering the actual replacement value of the mills, the investment requisite before a man or woman can be given work is not $1,000 but almost $2,000.

We are, therefore, given some idea, by the figures which have been collected, of the importance

of our industry to the great number of stockholders, to the greater number of employes and to unknown numbers who are indirectly dependent on the industry.

Since this collection of information relative to the Cotton Manufacturing Industry was begun, the Wall Street Journal, published in New York, has been carrying on a general investigation of the question of the number of stockholders in all kinds of corporations and the results have been most interesting and deserve careful consideration by thinking people. In ten years' time, the number of stockholders in corporations has increased from 226,000 to 872,000, and there seems to be no reason to doubt that a similar rate of increase will continue. In other words, whatever real value there may be in the corporations, and whatever the stock issues represent, more and more will belong to the people at large. Mr. George W. Perkins stated recently that he expected in the near future that the United States Steel Corporation would have at least 200,000 stockholders. The management of the American Sugar Refining Company stated that the people of New England have put so much of their savings into the stock that it is chiefly held in small amounts by New England people. Mr. Theodore N. Vail, President of the American Telephone & Telegraph Company stated that this corporation had over 40,000 stockholders on June 30, 1911, and the holdings per stockholder continually become smaller. The same tendency is notable in all the great corporations together with the universal fact that large numbers of women are stockholders.

When the reports made to the United States Census of 1910 are published, it will be interesting to see how large a number of our people are stockholders in corporations, which information has been collected for the first time in the census. In this general connection I quote from a recent article in the New York Commercial as follows:

"It is a popular notion fostered industriously by all the 'trust-busters,' 'uplifters' and demagogues that the great corporations are owned by small coteries of vastly wealthy men who employ them as instruments of oppression of weaker competitors and against the public interest generally. There have been instances of this, of course, and it is a fact that in not a few cases the control of the stocks of the big corporations is in the hands of comparatively small groups of men; but the notion that only the rich and the powerful own these concerns and that they are in general 'oppressors' is a highly exaggerated one—exaggerated to the point of the ridiculous. If a dozen of the larger corporations most commonly under indiscriminate attack by press, pulpit, platform and corner groceries were today to be ordered by the courts to go out of business or conduct that business by archaic and long-discredited methods, millions of holders of life-insurance policies and more millions of savings-bank depositors would have their investments imperiled. You cannot inflict injury on a 'trust' without injuring hundreds of comparatively poor people—and, strange to say, the public is just finding it out.

"While the numerous congressional investigations now in progress are largely uncalled for, expensive alike to the Government and to the corporations concerned and designed chiefly for the creation of 1912 campaign capital, they may possibly do some good in enlightening the people into the real ownership and conduct of the 'trusts' and in sounding a warning to legislatures and Congress and public prosecutors against ill-considered, unwarranted and unfair assaults on great popular interests."

ATTACKS UPON INDUSTRY

I am inclined to believe that the popular wave of prosecution, and even persecution, of the so-called trusts and large business interests has nearly reached its crest, and before long will begin to subside. The people at last are beginning to realize that these attacks cannot be continued indefinitely and indiscriminately without wrecking the whole business life of the nation and bringing distress to the people at large. It is gradually, but steadily, becoming clear that whatever affects the great interests affects in like manner the small, for the success of each is dependent upon the success of the other.

Let us hope that the time is near at hand when the man who conducts a great industrial enterprise will be looked upon once more as a public benefactor, not as a malefactor, and when the people will realize that he is of more value to the state than the demagogue who attacke him for the sole object of attempting to deceive the people in order to get their votes.

As soon as unfair attacks, of whatever nature, on industry cease and there is certainty as to the manner in which business can be carried on, confidence in the future will be restored and prosperity will return again to the entire country. Let us do all we can to hasten the advent of that much to be desired time.

THE AUTUMN MEETINGS

The Association, by holding its semi-annual meetings at rural points and by carrying on its sessions in the morning and evening, thus allowing the members to pass the afternoons as they may desire, performs a useful purpose. It thus not only provides a bit of vacation life, which certainly does no harm to anyone in these days of intensive work, but also affords an opportunity for the members to associate personally and exchange views on their several problems and experiences which prove both pleasant and profitable.

This year the meeting will be held in one of the most beautiful spots in the heart of New England, in the valley of the picturesque Battenkill stream with its fertile intervales flanked on the east by the northern peaks of the Taconic range, and on the west by the southern ones of the Green Mountains, and the innumerable pictures of nature present a variety of natural beauties of stream and lake, of field and forest and of mountain and vale whose attractions are beyond my description.

It is among these surroundings, outside of the business sessions, that we may obtain rest and recreation and even inspiration which will enable us to return to our several duties, refreshed and renewed in courage and strength, and to take up again the cares of life with increased skill and added vigor.

THE WORK OF THE TARIFF BOARD IN CONNECTION WITH THE COTTON INDUSTRY

By PROF. HENRY C. EMERY, Chairman of the Board

In view of the unusual investigation which the Tariff Board is making into the business of members of this association, it is not unnatural that you should ask me to come to this annual meeting and explain something of the nature and significance of our undertaking. I am glad to do this not merely because it is only responding fairly to a fair request, but because it enables me, and those of my associates who are here, to make the acquaintance of many of your members whom we have not known before personally. Such meetings ought to lead to a clearer knowledge and understanding of a problem which is of great interest to all of us and of wide importance to the community at large.

PROF. HENRY C. EMERY.

From the beginning, our policy has been as far as possible to study an industry in its own home; to coordinate a study of the figures with a study of the processes in the mills themselves; to visit merchants in their offices and manufacturers in their mills in order to talk with them on their own ground and learn so far as we can the peculiarity of each locality. In some quarters this has been considered improper conduct and every visit to a mill has been viewed with suspicion by one party, and every visit to a mill's customer with misgiving by some other party. However, we have seen no other fair course in seeking the desired information than to go to those places where such information is to be found.

Our purpose is to secure, so far as possible, all the facts needed for the logical application of whatever principle of tariff taxation the public may decide to adopt; and to arrange and tabulate these facts so as to make them easily available to those to whom the determination of tariff legislation has been entrusted by the Constitution and the will of the people. What degree of taxation shall be adopted by Congress or approved by the people is no concern of the present Tariff Board, nor should it concern any Tariff Commission of the future. That must always remain a matter for the duly elected representatives of the people. It is not for us to determine rates or suggest rates; to determine how much protection should be granted, or on which commodities the Government should raise its revenues. But granted that Congress and the people have determined on a certain general policy, such an investigation as ours would furnish the knowledge on which to apply it in detail so as to get the actual results desired. It frequently has happened in the past, not only in the case of the tariff, but in the case of legislation in many other lines, that laws intended to secure a certain condition of affairs have resulted in quite a different condition of affairs. This has been the result of inadequate knowledge, or incomplete consideration of the factors involved. In all cases, however, it is only the function of an investigating board to show what the facts are and what results might be expected from a change. Whether the change be desirable or not is not for them to say.

An investigating board ought, after sufficient experience, to be able to show what kind of a duty would prevent foreign competition altogether; what kind of a duty would permit foreign competition when business is good and the demand active; what kind of a duty would permit vigorous but not disastrous competition at all times; what kind of a duty would make domestic production in a certain industry so unprofitable as to force a wide curtailment of the industry at home, and the substitution of the foreign for the home-made article. But which of these conditions is best for the welfare of the whole country is purely a question for the people, through Congress, to decide. One thing ought to be noted, namely, that all general tariff measures, whether intended for protection or for revenue only, which have ever been seriously considered in this country, involve the taxation of a large number of articles which compete with the same or similar articles produced at home. Consequently such taxes, even if laid on a revenue basis, are in some measure protective and have a corresponding effect on the industry. Whether any duty is prohibitive, highly protective, or very slightly protective, all depends on the conditions of competition that have to be carefully studied. You gentlemen know that it would be easy to find a single ad valorem rate of duty on cotton fabrics which would be practically prohibitive on cheaper grades where the value of the material is very great in proportion to labor, and yet would allow large importations of the higher grades where the material is a small proportion of the cost. It would not be a function of an investigating board to express opinions as to the wisdom of such a measure, but simply to study carefully the facts, so that the public might know what goods would be excluded and what goods probably admitted under such legislation.

One thing I wish to emphasize in this regard is

that the matter of getting relative costs in the case of staple products is practicable as well as important. There has been much discussion of this question and many doubts have been expressed as to whether, in view of the great difference of cost under different conditions of production in the same country, such an inquiry could be carried to any successful conclusion. I am convinced that in the case of staple articles, this can be done with sufficient accuracy for tariff purposes. I speak with all the more confidence because I was, myself, one of the doubters at the outset. I believed that much information of great value could be secured even if a detailed inquiry into costs should not prove feasible, and I frankly expressed my doubts on this last point. Since then I have become convinced by experience that my own doubts in the matter were exaggerated. So far as yarns and staple cotton fabrics are concerned, we are confident that our results are accurate and furnish a thoroughly sound basis of comparison.

At the very outset of our work, our first problem was to establish certain general principles of cost accounting as a guide to all our investigations into different industries. In view of the conflicting theories and practices in this regard, the problem was far from simple. The next problem was to adopt these general principles in detail to the peculiarities of a particular industry by careful conference with practical men in the trade. This was done first for chemicals, then for pulp and paper, and thirdly for cotton. In the preparation of the cotton schedule some weeks were spent by our agents, including statisticians, cotton-trade experts, and accountants trained in cotton manufacturing, in studying both the books and the processes at various mills, and their results were submitted to the Board for final revision. They may not exactly fit the cost accounting methods of individual mills, but they come as near to meeting the requirements of the industry as a whole as is practically possible, and have proved themselves easily adaptable to all mills employing modern cost methods.

It has, of course, been impossible in the time allowed us to cover all the mills of the country on this detailed and thorough basis, but we are confident that with due regard to the necessity of getting representative mills, much thoroughness will give fairer results than a superficial survey of all the mills. As it is, we are covering a very fair proportion of the industry.

In determining upon the particular mills from which to take out cost figures, we have been governed by several conditions. We have first attempted to take representative mills on their particular classes of products in the several localities. Occasionally we have met with refusals on the part of the manufacturer, but even where permission was granted we have had to omit several mills because their records were not sufficiently complete to warrant our attempting to figure their costs.

Let me, in a few words, give a brief description of the exact nature of our investigation. All papers pertaining to a plant are given an identification number at the Tariff Board office immediately upon their receipt, and the name of the plant appears in no way in connection with any figures or data. This assures complete secrecy as to individual mills. For the purpose of simplifying the tabulation of our results, we divide the plant into the "Spinning Mill" and the "Weaving Mill"; the former including picking, carding, spinning, spooling, twisting, and either raw stock or skein dyeing, the remainder of the processes being included in the weave mill.

Schedule I covers general information, such as number of spindles and looms operated, classes of goods manufactured, etc.

Schedule II covers the equipment and operations of the spinning mill, giving data regarding the date the plant was erected, total number of employes, working hours, power data, machinery equipment, yarn organization, and a complete report in detail of all the wages paid and the work performed.

Schedule III covers the cost of manufacture in the spinning mill, and is a report of all expenditures for a given period, covering materials used (cotton and dyestuffs), labor, works expense (supplies, fuel repairs, and maintenance, general help, teaming, office and administrative expense), fixed charges (depreciation, taxes and insurance), and the value of wastes sold. To this is added a report of the pounds spun for each size of yarn and spindles operated, for the purpose of making the proper distribution of the moneys expended upon each kind of yarn.

Schedule IV gives the equipment and operation of the weave mill, which covers the same information obtained in Schedule II for the spinning mill.

Schedule V covers the cost of manufacture in the weave mill and includes the same items of cost as the spinning mill, namely: the materials used, labor, work expenses, fixed charges and waste, with the additional item of selling expenses. With this, we show the organization of the cloths produced, the pounds or yards of each, with the high and low selling prices that prevailed during that period.

As a supplemental report, we take the financial statements for a period of ten years, or as long as they are obtainable.

Our cost data are taken for a period of a year, or six months (and in a few cases, a quarter), depending upon the records at the mill and the variety of cloths manufactured, and this period is selected with a view to covering as large a proportion of machines operated as possible. In all cases the figures are taken from the actual records at the mill—from the ledger and manufacturing accounts, pay rolls, etc., and from these results we figure our own costs.

The question of extending costs of yarns and cloths is a matter that is subject to considerable discussion, but those of you whose mills we already have taken will agree with me that our methods, while generalizing in some respects, are thoroughly equitable; in fact, at none of the mills so far taken have they been seriously questioned.

Briefly our methods of distribution and cost finding are as follows:

In the fine fancy mills, manufacturing a large variety of cloths, requiring a wide range in counts, it has been necessary for us to go into some little detail in order to get equitable costs of the yarn. While we know of several of these mills that fig-

ure their yarn cost in proportion to the number of the yarn itself (or as it is usually expressed, on the "average number basis"), we did not consider this a fair basis because it makes the cost of fine yarns too low and of coarse yarns too high. We therefore figure the carding labor cost in proportion to the fine roving or jack spindles operated on the several rovings; the spinning labor (i. e., the cost of spinner and doffer or back-boy) where obtainable, is figured directly from the prices paid for these two operations, and the remainder of the spinning cost distributed on the spindle basis, and where this could not be done the entire cost of spinning is apportioned on the spindle basis; the cost of spooling is apportioned on the basis of the spooler spindles operated on the several warp yarns. From these distributions, the total cost of each yarn is obtained. The cloth costs are then extended by using the actual per cents of warp and filling yarn in each cloth, to which is added the labor cost of weaving (figured from the prices paid per cut to weave) and the other expenses of the weave mill apportioned on the loom basis. This total gives us what might be called the total conversion cost of each cloth.

In the mills on standard prints and sheetings, and those mills in which the production is confined to very similar construction, there are only a few different yarns spun and the counts will vary but little. In these mills, for the yarn cost, the labor is distributed on the average number basis, and all general expenses of the spinning mill are apportioned on the spindle basis, the totals giving the cost of each yarn. The cloth costs are obtained from the cost of the yarns and the per cents of warp and filling in each cloth, to which is added the weaving labor and general expenses on a poundage basis, the result being the total conversion cost.

The cotton cost is based upon the actual waste made at each mill as shown by their records, due allowance being made for any variation in stock in process that would affect the value of the stock in the finished product.

I will add, that all extra or "special" items of cost, such as dyeing, twisting, shearing of lappet weaves, etc., that are not referred to in the general outline above, are equitably apportioned to the particular processes or cloths to which they apply. Also in mills in which the yarn cost is figured on the actual poundage of the yarn spun, these costs are equitably appreciated to allow for the weave mill waste so as to give the correct cost of the yarn in the cloth. Where the yarn cost is based on the actual yarns in the cloth produced, this appreciation is of course omitted.

The costs as determined by our method of extension are, of course, always submitted and checked up with the officials of the mill, and in the case of any serious divergence, which is rare, the discrepancy is run down and our figures corrected if proved in error.

In tabulating these results, our reports will show just how much of each cost is labor, as well as the general and administrative cost, the cotton cost, and the charge for depreciation. The two latter items, cotton and depreciation, we will charge to each mill at the same figure in order to put them on the same basis. For instance, if one manufacturer has been fortunate in making a

ON THE EQUINOX GOLF LINKS.

good cotton contract and has a wide margin over his competitor on the cost of cotton alone, we shall consider not only his actual cost, but the cost at both mills on the basis of the same purchase price of cotton in order to make their respective costs comparable. On depreciation, we shall determine upon a standard per cent. to be charged for buildings and machinery and apply it to all the mills, regardless of the amount actually carried on the books. This will put all the mills on the same footing.

This is an outline of one part of our cost investigation. In addition to this, we are carrying on a supplemental investigation of cost by means of a series of samples. We have a number of samples which represent every class of fully 90 per cent. of all cotton goods marketed in this country; we are getting the costs of those of the samples made in each of the mills that we have taken, and besides this, we will get the cost of manufacture of these samples from a number of other mills wherever they are made, these sample costs to be figured by the manufacturer himself and accepted by us as his cost.

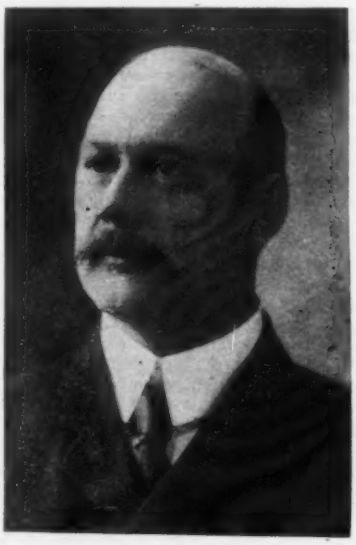
It is not possible to explain in detail the other lines of investigation to which I have referred, but I should, of course, say that we are not confining the investigation to the manufacturer or to his mill costs. You will be interested to know that the investigation extends from the manufacturer through the commission house and jobber to the consumer, showing the relation of the manufacturers' cost and mill price to the prices paid at different stages down to the purchase of the article by the consumer.

THE WORK OF THE MONETARY COMMISSION

By HON. JOHN WINGATE WEEKS, West Newton, Mass.

The Monetary Commission undertook its task, studying first our own defects and needs; then making a thorough study of the systems employed in foreign countries for the purpose of grafting on to our system such parts of them as could be used, modifying them to meet our peculiar conditions. With that purpose in mind, investigating committees have been abroad, a carefully prepared up to date financial library has been published, the financial systems of foreign countries having the best methods have been carefully investigated, our own banking deficiencies have been given the amplest consideration and the Commission is substantially ready to make a report, which, under the law passed at the recent special session of Congress, must necessarily be made before the ninth of next January. Much public criticism of the Commission, most of which was unwarranted, has recently been made on account of the appointment to it of three men who were formerly members of the Senate or House, but whose terms had expired. That fact is the only real basis for this public criticism and the discussion which has taken place in Congress. No member of the Monetary Commission had any voice in the appointment of these members, and it was manifestly against the original purpose in making up the commission, because, as I have stated, it is desirable that all of its members be active members of Congress. With this exception, however, there is, in my opinion, no real reason for criticism of the Commission, the work of which has been proceeding as rapidly as its members could give the time for that purpose and without any unreasonable expenditures. In fact the expenditures which have been made are trivial compared with the importance of the subject and the benefits which may be derived from a correct solution of it.

Early in the year Senator Aldrich, as the result of a vote of the Commission, prepared the framework of a plan to be considered and used as a basis for the final report to be made by the commission. The result of this action is what is



HON. JOHN W. WEEKS.

known as the Aldrich plan, which not only embraces the views entertained by Mr. Aldrich, but the well-known ideas of many members of the Commisson. This plan has been, since it was made public, investigated in some form by most of the bankers of the country, and systematically and thoroughly by official committees of the American Bankers' Association, by the banking associations of many states, and by a large number of financial students and economists. With trifling exceptions the plan has been received favorably—in fact, almost without exception, with unqualified words of commendation and approval.

Before considering the plan in detail, however, I wish to call attention in definite terms to the weaknesses in our present currency system and banking methods.

First. Our currency, which is thoroughly sound and is accepted at its face value throughout the civilized world, has almost no elasticity. A scientifically correct currency should be one having sufficient reserves; which, at the same time, would expand and contract with the needs of trade. We

have, substantially, the largest per capita circulation of any country in the world, which, in round numbers, includes a billion and three-quarters of gold, or gold certificates; six hundred millions of silver, or silver certificates; three hundred and fifty millions of greenbacks, and seven hundred millions of national bank notes, making a total of about three billion, four hundred millions of dollars. The issue of greenbacks is limited by law to the amount at present outstanding. The volume of metallic money cannot be readily increased in case of need, and has no relation whatever to the necessities of trade. The only element in our circulation which has any elasticity is the national bank note, secured by government bonds. As the total debt of the country available for this purpose is only about nine hundred millions, and as there is even now, in comparatively quiet times, seven hundred millions outstanding, it will be seen that it would be impossible to greatly increase this amount in case of need. Practically all of the government bonds not now used for this purpose are held in such a way that they would probably not come on the market.

Second. Under the laws, the reserves of all national banks, and of practically all others, are held by the banks in reserve or central reserve cities. In a final analysis they reach the banks of the three central reserve cities, a very large percentage of them coming to the most important of these, the city of New York. As the pernicious practice of paying interest on these reserves prevails, it becomes necessary for the reserve banks to make active use of these deposits, the result of this being that frequently large quantities of reserve money become involved in stock market and other speculative ventures. This is especially true when business conditions do not require the use of money in the localities where it naturally belongs. The calling home of surplus moneys, followed frequently by the withdrawing of reserves, creates an unnatural and unusual condition in the reserve centers and is often the inciting cause of money stringencies and resulting panics like that of 1907. No interest should be paid on bank reserves, and they should be either held in the vaults of the bank itself, or deposited where they would be available in case of need without creating unusual conditions by their withdrawal.

Third. Heretofore there has been no coordination or leadership among the banks. This is especially necessary in meeting monetary disturbances. In fact, business jealousies and other reasons have made banks hesitate to take the lead in instituting measures to relieve distress during such disturbances until it has become apparent that a failure to do so would mean a total financial collapse, in which cases Clearing House certificates have been issued to temporarily relieve the situation, always with a favorable result as far as local conditions are concerned, but resulting in the total breaking down, for the time being, of domestic exchange, thus causing great and unnecessary disturbances in business.

The Aldrich plan proposes to correct these three conditions, and, in addition, to make other valuable changes, all of which I will now briefly describe.

It proposes the organization of a reserve association, to be called the Reserve Association of America, having an authorized capital of three hundred millions of dollars; a charter limited to fifty years, with main offices in Washington, D. C.; that the country shall be divided into fifteen districts and that a branch of the Association shall be located in each district. The two criticisms of such an association which have been, and are, most frequently used are that it will be impossible to prevent its becoming a powerful political agent, or to prevent its getting into the hands of special interests, to be used for selfish and personal purposes. In my opinion, both of these dangers have been adequately provided for in the Aldrich plan. Banks are to be the only subscribers to its capital stock. When a bank becomes a member of the Association it may subscribe to an amount of capital stock equal to 20 per cent. of the stock of the subscribing bank, and no less than that, and such bank shall become a member of a local association. Shares of the capital stock shall not be transferable, and will not, under any circumstances, be held by any other owner than a bank. Therefore, in order to obtain control of the Reserve Association, it would be necessary to obtain control of the banks of the country, or at least of those belonging to the Association.

All subscribing banks shall be formed into associations of not less than ten banks, with a combined capital and surplus of not less than five millions, a form similar to the organization of Clearing Houses in cities. These local associations shall be grouped into fifteen divisions. The manner of electing directors of not only the Reserve Associations, but of its branches and the local associations, combines the principles of bringing together the power of the states in the Federal Government. In the local association three-fifths of the directors shall be elected by representatives of the banks in that association, each bank having one vote. Two-fifths of the whole number of directors shall be elected, each bank being entitled to cast as many votes as it has shares in the Reserve Association.

Directors of the branches shall be elected as follows:—The Board of Directors of each local association shall elect one member of the Board of Directors of the branch to which it belongs. This would insure as many directors as there are local associations in that district. In addition to that number there shall be elected a number of directors equal to two-thirds of the number of local associations in the district where the branch is located, and in choosing these directors each bank shall be entitled to as many votes as it holds shares in the Reserve Association. These elected directors shall then meet and elect an additional number of directors equal to one-third of the local associations in the district, these last directors to be selected from the industrial, commercial, agricultural and other business interests of the district.

Directors of the Reserve Association shall be forty-five in number, six of whom shall be ex-officio members, namely, the Governor of the Reserve Association, two Deputy Governors, the Secretary of the Treasury, the Secretary of Commerce and Labor and the Comptroller of the Currency. Fifteen directors shall be elected, one by

each of the Board of Directors of each branch of the Reserve Association, each branch having one vote. Twelve additional directors shall be elected by voting representatives, one representing the banks embraced in each district. Each representative shall cast a number of votes equal to the number of shares in the Reserve Association held by all the banks in the district which he represents; and the board of thirty-three members, as then constituted, shall elect twelve additional members who shall represent the industrial, commercial and agricultural interests of the whole country. No member of any national or state legislative body shall be a director of the Reserve Association, or of any branch or local association.

There are restrictions and limitations as to the qualifications for directors which I will not include in this statement, but I think there is general agreement that the provisions which I have outlined will prevent the possibility of political or other control of the Reserve Association. That is the purpose of the plan, at least, and if any person has any suggestion which will strengthen this purpose, and which will not add necessarily to its cumbersomeness, I feel sure it will be adopted by the Commission.

The plan, as suggested by Mr. Aldrich, provides that the Governor and the Deputy Governors of the Association shall be appointed by the President of the United States from a list of names furnished by the directors of the Association, and only from such a list. There has been criticism of this proposition on the theory that it might provide the possibility of rewarding political friends, or for the removal of a competent official on account of political or personal reasons; and while this proposition may be changed when final action is taken, I do not believe that there is any real basis for this criticism, for it is not likely in these times that public sentiment would countenance any such action on the part of the President, even if it would be possible to elect to the Presidency a man who would use such a position in such a way.

Under this plan the Reserve Association will be the custodian of the ultimate reserve supply of the country. If the redemption of all classes of circulation now outstanding should be turned over to the Association—which should be done—it will hold, as a result, the largest single gold supply in the world, aggregating more than a billion dollars, thereby insuring an adequate supply of coin or bullion for export, as well as a suitable reserve for its note issues and for redemption purposes. The plan provides that the reserve mechanism shall meet emergencies by rediscounting for other banks, and it may issue its notes to cover such rediscounts, if requested to do so, which will reverse the course which reserve money takes in the ordinary panic, insuring, I believe, increasing, rather than lessening, reserves at such a time. The authorized circulation is to remain the amount of national bank notes now outstanding—about seven hundred millions—but additional issues may be made, if required, of one hundred millions, which shall pay a tax of 3 per cent.; one hundred millions, which shall pay a tax of 4 per cent.; one hundred millions which shall pay a tax of 5 per cent.; and on any additional amount which may be found necessary a tax of 6 per cent. shall be paid. This will prevent any possibility of currency demand becoming acute in time of panic. There is opposition to taxing currency issues, and, in my judgment, the opposition is warranted, for such a tax is simply a tax on business; but there is fear in the minds of many that unless such a tax is provided there may be, instead of a temporary, a permanent inflation, and we may be certain that the tax imposed, as provided in this plan, will promptly retire such circulation when there is no longer a demand for it. The proper basis for such a tax would be the volume of reserves—increasing as the reserve decreases.

The result of this authorization will be that the Reserve Association will be able to control interest rates, for, if it finds it is losing gold more rapidly than it should, it will advance the rate of discount so that there will not be a profit in withdrawing capital from America, and it will be in this way that the Reserve Association will be able to take a leadership in money market affairs; and, being in constant touch with all the elements of the banking situation, the Reserve Association will not only be able to control a panic, if one should arise, but, if properly managed, it should prevent the possibility of their being a panic, as we understand that term.

The Central Reserve Association of the Aldrich plan differs from most central banks, and especially the First and Second United States Banks, in that it shall not be, in any way, in competition with other banking organizations. In its operation, as outlined, instead of having a centralizing effect it will have a decentralizing result, beneficial to all sections and especially to those removed from the great centers. It is limited in its functions to business with the Government of the United States and those banks holding stock in it, these being the only depositors in the Reserve Association. In addition, however, to transactions with these two customers, it may purchase or sell government or state securities, or securities of foreign countries, or gold coin or bullion. It is proposed that the government shall deposit its cash balance with the Reserve Association, which shall include all governmental receipts; and that all disbursements of the government shall be made through it. In addition to these functions the Reserve Association may rediscount notes and bills of exchange arising out of commercial transactions for, and with the endorsement of, any bank having a deposit with it. These notes must have a maturity of not more than twenty-eight days, and must be made thirty days before the date of rediscounting. The character of the note is still further restricted in the conditions which appiy to it.

The Reserve Association may also rediscount for depositing banks, notes and bills of exchange not exceeding four months to run, but such discounts must be guaranteed by the local association to which the bank belongs. In addition to the functions enumerated, whenever, in the opinion of the Governor of the Reserve Association, public interest requires, it may discount the direct obligation of a depositing bank, which, however, must

be endorsed by the local association, which, in turn, must be secured by satisfactory collateral; and the Reserve Association may also purchase from a depositing bank acceptances of banks or houses of unquestioned financial responsibility, under the usual restrictions and limitations which apply in such cases. It may also purchase bills of foreign exchange in cases where the exchange arises out of commercial transactions, under proper restrictions as to time and endorsements. The Association, in addition to its branches in the United States, may establish branches abroad, and foreign branches are to be suitably limited in their functions. By these provisions the Reserve Association is empowered to do about what has been done for many years by the central banks of first-class European countries, adjusted and suited to our peculiar conditions and needs. It will be observed that the powers of the National Reserve Association are, in all cases, supplementary to our present system, and are not, in any instance, brought into competition with it. This does not mean that some changes in detail might not be made which would improve our system, but it is difficult to bring about fundamental currency or banking changes in any case, and it is not deemed wise to add to our difficulties by interfering with methods and practices which have, generally speaking, worked satisfactorily.

The functions of national banks are increased by permitting them to accept commercial paper drawn upon them, not having more than ninety days to run, properly secured and arising out of commercial transactions. The amount of this paper, however, shall not exceed one-half the capital and surplus of the accepting bank. While this provision has nothing to do with the fundamental changes for which the Aldrich plan provides, it will, in my judgment, have a material effect in developing our foreign trade and in making more stable interest rates, and will enable the business man to obtain all the credit to which he is entitled, under all circumstances. It will be noticed that the Reserve Association shall discount for banks in all sections of the country at the same rate of interest. This will not necessarily mean that local money rates, especially in the new and undeveloped sections of the country, will not be higher than in other sections, but it will mean that as far as the connection between local banks and the Reserve Association is concerned that all will be treated alike. This will have a tendency to equalize rates throughout the country, and will undoubtedly somewhat reduce the average rate which all classes of business men will have to pay, for it will give them a broader credit than they are now able to obtain, not only in this country, but, if their operations are large enough, in Europe as well. This procedure has been in vogue in Germany, France and Great Britain for many years, the result being that a business man conducting large operations not only establishes his credit at home, but in other countries as well, so that if, for any reason, local rates are high, or higher than those which obtain elsewhere, he uses his foreign credit, relieving the local monetary situation to that extent and obtaining his money at the lowest possible rate. The result of this has been that there are large quantities of German, French and English bills found in each of the other countries—generally in the country where the rate is lowest. This condition prevents the necessity for the shipment of currency whenever the trade balance is against any particular country, for instead of paying its debts by the shipment of currency, it simply sends back the foreign bills which it holds and pays its debts or obtains a credit therefor. Our people in their foreign trade, especially with South America and the Orient, have been militated against, because there has been no means of buying New York or other United States exchange in those countries. For example, if a European tanner should make a purchase of hides in the Argentine, the following would be the method of financing it: The European purchaser would arrange with his bank to accept sight bills drawn on him by the Argentine seller for a long enough time to cover the transaction. The latter draws his bills, attaches the documents applying to the transaction, turns them over to his local bank, which, in turn, sends them to its European correspondent, which, in turn, delivers them to the bank with which the acceptance has been arranged, which latter bank completes the transaction by making the acceptance, taking the documents and turning the acceptance back to the correspondent of the South American bank. It then, being a draft accepted by a well-known banking institution, is salable, not only in the country where the bank which has accepted the bill is located, but would probably be salable in any European center.

The time seems to have now come when there may be made a united effort to bring about this legislation. It is true that conditions at Washington, with the different branches of Congress and the President in antagonism politically, do not promise well for fundamental changes in anything. Still an effort has been made, and I hope successfully, to keep this question removed from politics. It should be, in no sense, a political question, for now most men admit that the government has the constitutional right to authorize and use national banks as fiscal agencies, and those who would permit the government to issue circulation direct are comparatively few in number. Yet the government should supervise and regulate the issuing of circulation; should regulate and control the methods of conducting business by its own agents, and should profit, to some degree, in return for doing its own business through the Reserve Association. I am, therefore, optimistic enough to hope that the report which the Commission will make next winter will be accepted and that the bill accompanying it will become a law. Certainly there is today no more important question before the public, and there cannot be one more important for Congress to consider than this. It will do more to preserve the stability of our commercial affairs and develop our foreign trade than any similar measure which has been considered since the days of the Civil War. I hope the plan may receive the consideration and cordial support of this Association, which, as much as any other, is dependent on stable conditions and the possibility of obtaining, at reasonable rates of interest, the necessary capital to conduct its business under all conditions.

ORGANIZATION OF THE CARDING DEPARTMENT IN COTTON MILLS

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The purpose of this paper is to discuss briefly the organization of carding departments in cotton mills. In considering the entire organization of the mill, this department includes the picking, carding, drawing, slubbing and roving, up to the spinning frames.

The subject is divided under several headings, the first being a general statement of organization, then to a discussion as to the most economical size of machine for each process, then to a series of production diagrams for roving machinery, then to a statement of the law of variation in the cost of roving, and finally, to the exhibition

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of diagramatic floor plans showing arrangements of the carding and roving machinery for a 50,000 spindle mill.

The arguments are all founded upon facts obtained from well known New England mills, the information having been taken from the ordinary running conditions from day to day.

GENERAL STATEMENT OF ORGANIZATION

Organizations of cotton mills may be classified under different heads, each class being made up of a different arrangement of machinery as follows:

A coarse mill requires a large amount of picking and carding with a comparatively small amount of roving machinery.

In mills of this class, it is possible to get along with only one process of drawing, and the roving may be taken directly from the slubber, or coarse intermediate to the spinning frame. It is advisable to run double roving on the spinning frame.

A medium coarse mill will have a smaller amount of picking and carding and will increase the number of roving spindles.

A mill of this kind would have two processes of drawing and two processes of roving, the slubber and fly frames. The spinning would be arranged for either single or double roving as desired.

A medium of print goods mill will continue to reduce the amount of picking and carding, and increase the number of roving spindles.

A mill of this kind would have two processes of drawing and three processes of roving, with single or double roving in the spinning.

By introducing a fourth process of roving, or jack frame, such a mill can go onto fine numbers, while combing may be introduced if it is desired to have combed work.

A print goods mill makes the most flexible type of mill, as it is possible to adapt the organization of such a mill for different purposes, either for coarse yarns, or medium yarns, or fine yarns.

The discussions following will be made with special reference to a print goods organization.

A strictly fine goods organization appears to be in a class by itself. The picking is reduced to a minimum, the carding should be light, the drawing should ordinarily be in three processes, and operated to do all the evening possible.

In the succeeding processes, the speeds of the spindles should not be excessive. The roving machinery should run about as fast as in the print goods mill.

A fine goods mill requires less power to operate the machinery than mills making coarser goods.

In organizing a mill to make goods for the general trade on print goods numbers, certain general rules can be applied in proportioning the machinery throughout the several processes so that practically all the conditions likely to arise can be successfully met. Questions sometimes arise in placing the machinery as to the best size of machine to adopt for a certain process, and there is some variance of opinion in this matter, but the weight of opinion appears to favor the following general arrangement:

TABLE 1

Showing Relative Proportion of Machine of one Process to Another

1 set of picking, for 15 revolving flat cards, 40-inch lap.
10 revolving flat cards, for 9 deliveries of drawing.
15 revolving flat cards, for 2 slubbers, 12 by 6-inch bobbins, 60 spindles each.
1 slubber, 12 by 6-inch bobbins, 60 spindles for 2 intermediate frames, 10 by 5-inch bobbins, 84 to 92 spindles, each.
1 intermediate, 10 by 5-inch bobbins, 84 to 92 spindles, for 2 roving frames 7 by 3 1/2-inch bobbins, 160 to 168 spindles, each.

By following the above general rule for proportioning the machinery for the several processes, it is claimed that variations due to climatic conditions, quality of stock, and changes required to be made from time to time, can be successfully met and compensated for with the least amount of loss.

CARDS

There are two sizes of cards in use, both of which have their advocates, the 40-inch card and the 45-inch card. The width of the card estab-

lishes the width of the picker as a general rule, although it is possible to make 40-inch laps on a 45-inch finisher picker by making adjustments on the picker in a case where a mill might have 45-inch pickers and desires to use 40-inch cards.

TABLE 3

Class.	Slubber	Intermediate	Roving	Jack
Coarse	12" x 6"	10" x 5"	None	None
and	12" x 6"	None	8" x 4"	"
Medium,	11" x 5½"	None	8" x 3½ '	"
Print	12" x 6"	10 ' x 5"	7" x 3½"	
Numbers,	11" x 5½"	9" x 4½ '	7" x 3½"	
Fine	12" x 6"	10" x 5"	7" x 3½"	6 ' x 3"
Numbers,	11 x 5½ '	9 ' x 4½"	7 ' x 3½ '	6" x 3 '

TABLE 4-A.

Mill "A." 12-inch by 6-inch slubber, front roll 3.92 inches. Spindle 620 revolutions per minute

Number of Roving.	Revolutions per Minute, Front Roll.	Hanks per Week.	Pounds per Week.	Efficiency Per Cent.
0.70	140	58	82	86
0.65	170	60	92	74
0.56	176	70	125	88
	Average of above =		100	83

TABLE 4-B.

Mill "B." 11-inch by 5½-inch slubber, front roll 3.92 inches. Spindle 740 revolutions per minute

Number of Roving.	Revolutions per Minute, Front Roll.	Hanks per Week.	Pounds per Week.	Efficiency Per Cent.
0.50	226	65	130	64
0.50	226	70	140	68
0.50	226	80	160	78
	Average of above		143	70
0.50	226	83.75	167	82

TABLE 5-A

Mill "A." 10-inch by 5-inch intermediate, front roll 3.92 inches. Spindle 861 revolutions per minute.

Number of Roving.	Revolutions per Minute, Front Roll.	Hanks per Week.	Pounds per Week	Efficiency Per Cent.
2.00	110	40	20	80
1.65	143	52	32 5	80
1.60	145	58	36	88
1.55	147	58	37.5	88
	Average of above		31	84

TABLE 5-B

Mill "B." 9-inch by 4½ inch intermediate, front roll 3.53 inches. Spindle 975 revolutions per minute.

Number of Roving.	Revolutions per Minute, Front Roll.	Hanks per Week.	Pounds per Week.	Efficiency Per Cent.
1.40	180	48	33	63
1.40	180	50	35 6	67
1.40	180	55	39	74
1.40	180	58	41 5	79
1.40	180	60	43	81.5
	Average of above		38.4	73

A 40-inch card requires less floor space in width than a 45-inch card. It requires about 33 per cent. less power to drive it. Its first cost is less.

A 45-inch card has to be more rigidly built than a 40-inch card; it requires more attention to keep it lined up and properly gauged than a 40-inch card.

The product of a 45-inch card is generally no greater than a 40-inch card, although this is one of the claims made for it. To get the best results from carding, the product of a card should not exceed the amounts shown in the following table, regardless of the width of the card:

TABLE 2

	Cotton	lbs. per hour	lbs. 58 hours
1	inch staple	14.50	841
1¼	inch staple	10.00	580
1⅜	inch staple	7.75	450

If a 45-inch card is used, it means that the lap is spread over a greater carding surface than with a 40-inch card; or that with a 45-inch lap weighing one-eighth more than a 40-inch lap, the 45-inch card must have one-eighth longer draft to produce the same weight sliver than a 40-inch card; or that with a one-eighth heavier card sliver, the drafts in the drawing and processes following must be lengthened, all of which may keep the drafts through the carding department too near the long limit and make it difficult if not impossible, to make finer roving if circumstances demand it.

The writer has a mill in mind now that is equipped with 45-inch cards. They cannot make a lighter weight lap without curtailing the product of the pickers too much; they cannot make a lighter weight card sliver without having an extra long draft on the card, and the drafts on the drawing and roving frames are as long as they should be now. If they had 40-inch cards, they would be able to make a lighter weight sliver without meeting the difficulties now confronting them, and so be able to produce a finer roving without altering the draft on the processes following the card.

The 40-inch card appears to be the one best adapted for meeting contingencies, and more suitable when it is desired to organize a mill to make finer numbers.

DRAWING

If the drawing process is proportioned to the cards about as shown in Table 1, there will be no difficulty in keeping the work balanced. In some instances, mills have installed evener railway heads in place of the first process of drawing, and the proportion of heads to cards will follow the same general rule as drawing.

ROVING MACHINERY

The roving machinery includes the slubber, intermediate frame, roving or fly frame and jack frame.

There appears to be some difference of opinion as to the most suitable size of bobbins to use in the various processes, but the weight of opinion seems to favor the larger size bobbin running at slower speeds, rather than the smaller size bobbin running at faster speeds.

The general rule followed as to sizes of bobbins in the various processes is shown in the following table:

Occasionally, there will be found a mill equipped with slubbers having 11-inch by 5 1/2-inch bob

bins followed by intermediates having 10-inch by 5-inch bobbins.

In order to draw a comparison as to the efficiency of one size bobbin over another size in the same process, the writer made some personal observations a short time ago of the product of various machines, taking the information from the ordinary running conditions from day to day as reported by the overseer of the room, and covering a period of several weeks.

Mill "A" has 12-inch by 6-inch slubbers, 60 spindles each; 10-inch by 5-inch intermediate frames, 84, 92 and 96 spindles each; 7-inch by 3 1/2-inch roving frames, 160 and 168 spindles each.

Mill "B" has 11-inch by 5 1/2-inch slubbers, 60 spindles each; 9-inch by 4 1/2-inch intermediate frames, 92 spindles each; 7-inch by 3 1/2-inch roving frames, 160 spindles each.

At one time in Mill "B," a special effort was made to determine how large a product could be taken from a pair of slubbers, the best operators in the room were detailed to run these slubbers for the time being; at the time, there was no intention of making any special test or comparison with anything else; it was simply an effort to see what could be done. The results are shown in the last line of Table 4-B, under Mill "B."

The following tables show the average results of the observations referred to above. The efficiency of the machine being estimated on the basis that 100 per cent. efficiency means continual running for a week of 58 hours, with no stopping to doff or piece up.

By comparing the results exhibited in the tables showing the efficiency of the different frames, the larger size bobbins and slower speeds show a higher percentage of efficiency in every case than the smaller size bobbins and faster speeds.

It is also true that when the work tends to run badly, owing to climatic or other conditions, the larger size bobbins at the slower speeds will run better and keep up a higher efficiency.

At one time, there was a tendency to speed up all machinery, but now-a-days the general tendency is to keep to more conservative speeds and it is generally acknowledged that, to obtain the best results, the speeds should not much exceed, if any, those shown below:

In order to make a little more sharply contrasted comparison between different size bobbins in the same process, let us assume certain factors and construct the following tables. Certain of these assumptions will be common, namely,—Standard twist, circumference of front roll 3.92 inches for both slubbers, and intermediates; allowing the same length of time for doffing and piecing up per set for the same process, and the standard weight of a full bobbin for each standard size. Week of 58 hours.

While the 11-inch by 5 1/2-inch bobbin shows a little larger production than the 12-inch by 6-inch bobbin, it would require about 40 per cent. more attention by the operative for doffing and piecing up, and does not show so high an efficiency as the larger bobbin.

As to comparative costs, assuming frames of equal number of spindles for the same process, the frame containing the smaller size bobbin would cost less than the frame containing the larger size bobbin, but the difference would be more than offset as the smaller bobbin would consume more power, owing to its faster speed, and the wear would be greater, other things being equal. About the same amount of floor area would be occupied in either case.

TABLE 6-A.

Mill "A." 7-inch by 3½-inch roving frame, front roll 3.53 inches. Spindle 1,275 revolutions per minute.

Number of Roving.	Revolutions per Minute, Front Roll.	Hanks per Week.	Pounds per Week	Efficiency Per Cent.
4.10	133	47	11.5	87
4.76	102	35	7.35	85
5.00	102	35	7.0	84
6.00	82	18.5	4.75	85
7.00	78	29	4.00	88
7.50	74	25.5	3.40	85
	Average of above		6.33	85.6

TABLE 6-B

Mill "B." 7-inch by 3½-inch roving frame, front roll 3.53 inches. Spindle 1,300 revolutions per minute.

Number of Roving.	Revolutions per Minute, Front Roll.	Hanks per Week.	Pounds per Week.	Efficiency Per Cent.
4.00	153	46	11.5	74
4.00	153	48	12.0	77.5
4.00	153	50	12.5	81
4.00	153	52	13.0	84
	Average of above		12.25	79

TABLE 7.

Size of Bobbin.	Number of Roving.	Revolutions per Minute Spindle.	Revolutions per Minute Front Roll.	Hanks per Week	Pounds per Week.	Efficiency per cent.
12" x 6"	0.60	600	165	63	105	85
11" x 5½"	0.60	650	178	63.5	106	79
10" x 5"	1.65	850	140	57	34.5	90
9" x 4½"	1.65	900	150	52	31.5	87

TABLE 8

Organization

Process.	Size of Bobbin	Revolutions per Minute Spindle.	Number of Roving.	Revolutions per Minute Front Roll.	Weight Full Bobbin
Slubber,	12" x 6"	600	0.60	165	44 oz
Intermediate,	10" x 5"	850	1.65	140	26 "
Roving Frame,	7" x 3½"	1,250	5.75	123	10 "
Jack Frame,	6 x 3"	1,300	10.00	97	7 "

The comparison shows that the larger size bobbin is the better one for the reasons of more continuous run, less doffing, less piecing up of ends, less breaking down of ends owing to slower speeds, less care on the part of the operative, less handling of stock, and higher efficiency.

SIZE OF ROVING FRAMES

It may be stated generally, that a slubber containing less than 60 spindles is not as economical as one of 60 spindles, likewise an intermediate frame of less than 84 spindles is not so economical as one of 84 spindles, and that a fine roving frame of less than 160 spindles is not so economical as one of 160 spindles, because machines of less number of spindles than stated above do not furnish enough work for the operatives. Then the question is, how much larger frames than above stated can be installed without increasing the cost of product?

In making the comparisons as to product, certain factors are assumed as common to all frames,

namely: Standard twist, standard weight of full bobbin for standard sizes; circumference of front roll for slubbers and intermediate frames 3.92 inches, and for roving and jack frames 3.53 inches; week of 58 hours, and 3,000 hours per year, as being equivalent to all the working time.

The organization assumed and the production tables as calculated are based on actual results, as follows:

In making the comparisons as to cost of operating the frames, the cost of the frame is estimated to include the frame itself, the installation,

TABLE 9

Production of Slubbers for Different Size Frames.

1	Number of spindles,	60	64	68	72	76	80	84
2	Sets per week,	38	36	34	32	30	28	26
3	Hanks per week per spindle,	63	60	56	53	50	46	43
4.	Pounds per week per spindle,	105	100	94	89	84	77	72
5	Percentage of efficiency,	85	80	75	71	67	62	58

Production of Intermediates for Different Size Frames

1.	Number of spindles,	84	88	92	96	100	104	108
2	Sets per week,	20	19	18.3	17.5	16	16	15.5
3	Hanks per wk. per spindle,	53	51	49	46	44	43	42
4.	Pounds per wk. per spindle,	32	31	30	28	27	26	25
5	Per cent. of efficiency,	84	81	78	73	70	68	67

Production of Roving Frames for Different Size Frames.

1.	Number of spindles,	160	168	176	184	192
2.	Sets per week,	11.5	11	10.5	10	9.5
3.	Hanks per week per spindle,	41.5	40	38	36	34
4.	Pounds per week per spindle,	7.25	7.0	6.6	6.3	5.9
5	Percentage of efficiency,	83	80	76	72	68

Production of Jack Frames for Different Size Frames.

1.	Number of spindles,	176	184	192	200	208	216
2.	Sets per week,	7.8	7.5	7.2	6.9	6.6	6.3
3.	Hanks per week per spindle,	34	33	31.5	30	29	27.5
4.	Pounds per week per spindle,	3.4	3.3	3.2	3.0	2.9	2.75
5	Percentage of efficiency,	86	83.5	81	76	73.5	70

the proportionate cost of the necessary shafting, pulleys and belt, and the approximate cost of the room it occupies.

The comparative cost of power is based on $21 per horse power per year, based upon the rated capacity of the power generators operated by steam and water; this is equivalent to 0.7 of a cent per horse power hour, and in calculating the cost of power per frame the amount of horse power hours consumed is taken upon the efficiency of the frame.

The following tables show the comparative cost of operating frames of different sizes, using the same organization as exhibited in Table 9, and carrying out the costs to the nearest even dollar as being accurate enough for a comparison.

In order to emphasize the comparison as to the relative cost of manufacture of roving as shown in Table 10, the results are exhibited in diagramatic form.

These results are undoubtedly shown in practice when the work is running poorly, as then the shorter frames will keep up to a higher efficiency owing to less stoppage on account of breaking down ends, and other reasons.

For the most economical results in practice, the most suitable lengths of frames to install appear to be, slubber not more than 68 spindles, intermediate frames not more than 92 spindles, roving

TABLE 10.

Slubber Frame.

1. Number of spindles,	60	64	68	72	76	80	84
2. Cost of frame,	$1,182	1,232	1,306	1,369	1,442	1,514	1,587
3. Horse-power hours,	3,400	3,400	3,400	3,400	3,400	3,400	3,400
4. Labor per year,	$ 290	310	330	350	370	390	410
5. Power "	$ 24	24	24	24	24	24	24
6. Overhead charge,	$ 12	13	13	14	14	14	16
7 Total operating cost,	$ 326	347	367	388	408	429	450
8. Cost per pound, mills,	1.0	1.05	1.11	1.17	1.23	1.34	1.44

Intermediate Frames.

1. Number of spindles,	84	88	92	96	100	104	108
2. Cost of frame,	$1,347	1,453	1,572	1,691	1,805	1,927	2,054
3. Horse-power hours,	3,520	3,560	3,580	3,520	3,520	3,520	3,520
4. Labor per year,	$ 260	272	284	296	308	320	332
5. Power "	$ 25	25	25	25	25	25	25
6. Overhead charge,	$ 14	15	16	17	18	19	20
7. Total operating cost,	$ 299	312	325	338	851	364	377
8. Cost per pound, mills,	2.15	2 21	2.27	2.33	2.50	2.60	2.70

Roving Frames.

1 Number of spindles,	160	168	176	184	192
2. Cost of frame,	$1,318	1,383	1,436	1,484	1,552
3. Horse-power hours,	5,000	5,100	5,100	5,100	5,100
4 Labor per year,	$242	254	266	278	290
5. Power "	$ 35	36	36	36	36
6. Overhead charge,	$ 13	14	14	15	15
7. Total operating cost,	$ 290	304	316	329	341
8. Cost per pound, mills,	4.80	5.00	5.25	5.50	5.75

Jack Frame.

1. Number of spindles,	176	184	192	200	208	216
2. Cost of frame,	$1,260	1,320	1,472	1,521	1,584	1,638
3. Horse-power hours,	5,000	5,100	5,100	5,100	5,100	5,100
4. Labor per year,	$ 184	192	200	209	217	226
5. Power "	$ 35	36	36	36	36	36
6. Overhead charge,	$ 13	13	15	15	16	16
7. Total operating cost,	$ 232	241	251	260	269	278
8. Cost per pound, mills,	7.5	7.65	7.9	8.4	8.6	9.1

frames not more than 168 spindles, and jack frames not more than 184 spindles.

DIAGRAMS SHOWING PRODUCTIONS OF ROVING FRAMES

[Prints of the diagrams referred to may be obtained from author, 201 Devonshire St., or from this office.]

They have been constructed in order to show in a graphical and comprehensive manner, the different factors entering into the calculations of the production of roving frames. They are all based upon actual results obtained in practice.

With these diagrams it is possible to obtain the values of several unknown factors if one factor is known, for example:—Given a certain number of roving, then from the diagram may be read at

once the speed of the front roll, the twist per inch, and the product in hanks; or, given a certain product in hanks, and the diagram will show the number of roving, provided the efficiency of the machine is known and that the speed of the spindle is the same as shown on the diagram.

The diagrams could be made so that the factors could be determined for several different spindle speeds by ploting a number of twist curves to correspond to the different speeds, and the corresponding production curves, but to show so many curves on one sheet of paper would make a very complicated piece of work, and set aside the value of the diagram.

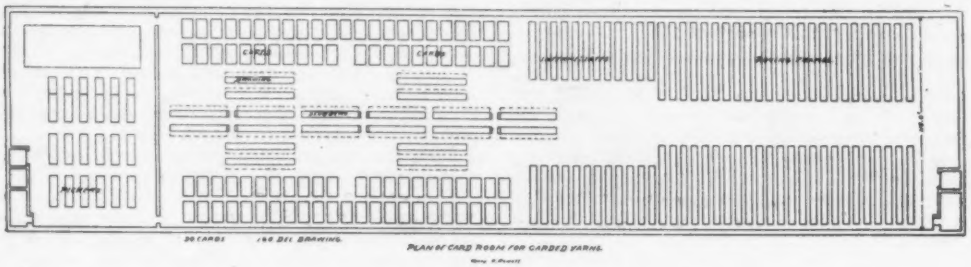

FIG. 1.

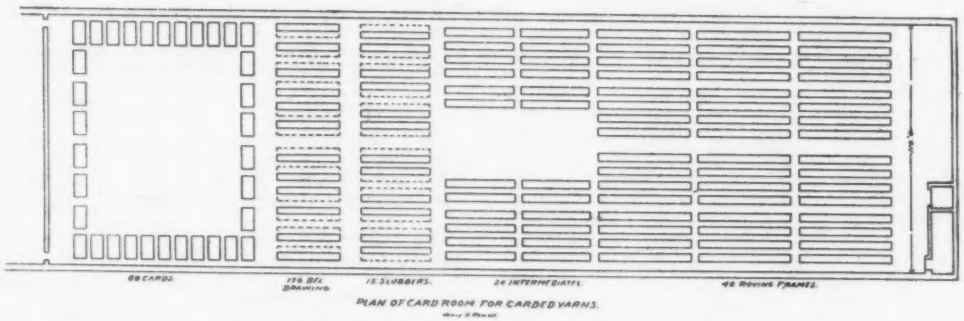

FIG. 2.

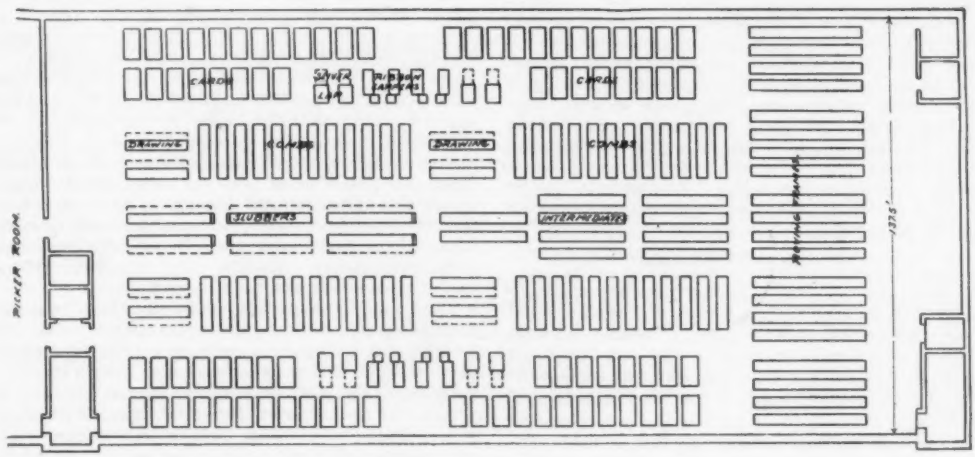

FIG. 3.

The diagrams are more comprehensive to plot a separate sheet for each speed of spindle.

The factors that can be ascertained by the diagrams exhibited are dependent upon the speed of

the spindle and the circumference of the front roll which are constant for each sheet, and stated on the twist curve; otherwise, the factors are independent of the size of the bobbin, or the number of spindles in the frame, except as these conditions may effect the efficiency of the machines.

LAW OF VARIATION IN COST OF ROVING

The discussion on the production of roving machinery leads to the consideration of the variation in the cost of roving for different numbers of various twists. In order to make this matter clear, a diagram has been constructed, showing the factors for different numbers of hank roving on standard twist and of number 5.75 hanking roving on various twists.

In describing the method of constructing the production curves, the rule is stated as to the variation in product in hanks due to the speed of the front roll, the spindle speed being constant.

It is an error to say that the cost in hanks varies in direct proportion to the hank roving as some do.

It is an error to say that the cost in hanks varies as the square root of the number of roving as a general rule, as this is only true when some standard twist constant is adopted.

It is correct to say that the cost in hanks varies in proportion to the speed of the front roll, as it is this function which governs solely the number of hanks delivered in a given time, regardless of the number of roving.

From the diagram referred to, it will be seen that with standard twist, 5.75 hank roving will have 2.88 turns per inch, front roll 123 revolutions per minute, and product 6.9 hanks in ten hours.

The same hank roving having a twist constant of 1.04 times square root of 5.75 will have 2.50 turns per inch, front roll 141.5 revolutions per minute, and a product of 7.94 hanks in ten hours. By way of comparison, it will be seen that 4.35 hank roving on standard twist will be 2.50 turns per inch, front roll 141.5 revolutions per minute with a product of 7.94 hanks in ten hours, and the cost per hank will be the same for each number of roving. Applying the rule of proportion to the speeds of the front roll, the result is seen to agree with the diagram.

$$123 : 141.5 = 6.9 : 7.94.$$

In order to obtain the cost per pound, multiply the number of roving by the cost of hanks divided by the number of hanks. Thus, if 7.94 hanks cost 5.2 mills, 4.35 hank roving will cost 4.35 times 5.2 $\div$ 7.94 = 2.83 mills per pound, and 5.75 hank roving will cost 5.75 times 5.2 $\div$ 7.94 = 3.74 mills per pound.

ARRANGEMENTS OF CARD ROOMS

Arrangements of card rooms are shown on Figs. 1. 2 and 3, in accordance with the organization schedule following.

Figs. 1 and 2 are to be taken together by way of comparison. Either of these methods will contain the same number of square feet floor area for the same amount of machinery. The advantages of the method shown on Fig. 1 are, that the amount of floor area for handling the stock is arranged to the most advantage, the machines are so disposed as to obtain the most light available, the room can be divided into sections for various classes of work, there is the least amount of moving sliver cans, and the cans from cards, drawing frames and slubbers are easily kept separated. This method lends itself particularly well to rooms of less than 100 feet wide, and is said by those who have rooms arranged similarly to be more economical in cost of operating than with an arrangement similar to that shown on Fig. 2.

This arrangement can be extended indefinitely without destroying any of the advantages.

The method shown on Fig. 2 would be improved if the drawing could be turned at right angles, but the purpose of this plan is to show that the drawing frames must be poorly arranged when the width of the room will not allow them to be arranged at right angles across the room, and there results a greater liability of mixing up sliver cans from one process to another.

Fig. 3 shows an arrangement for both carding and combing after the method shown on Fig. 1.

DISCUSSION ON MR. ROWELL'S PAPER

The following letter from Mr. Evan Arthur Leigh was read by the Secretary in Mr. Leigh's absence in England:

I have read Mr. Rowell's paper with very great interest and have particularly noted what he has to say with respect to the comparative merits of different widths of cards.

In this matter I must entirely disagree with him, as far as Platts' Card is concerned.

Mr. Rowell says a 45-inch wide card requires about 33 per cent. more power to drive than a 40-inch wide card, and that a 45-inch card is more rigidly built than a 40-inch card. As a matter of fact, a Platt 45-inch card does not require more than about 5 per cent. more power to drive than a 40-inch card, and the same construction is embodied in both widths of cards.

If this question of power had only been viewed from the standpoint of one machine having a greater carding surface than the other and the resistance assumed to be the same per unit of width across both machines, it could not even then have been reasonably expected that the difference in power should exceed 12 per cent.

It is well to point out, however, that the above reasoning is not by any means a fair one. We ought to base our assumption on each card producing the same weight under exactly similar conditions, viz: weight of lap per yard, draft, speeds, etc., to be equal. If we assume this, the 45-inch machine would then be carding lighter, consequently the percentage difference will be reduced, and further still, when it is considered that the whole of the driving together with a number of the working parts are exactly common to both widths of cards, so that in the face of this, the figure 5 per cent. is not far from being correct.

The working advantages that are claimed for a 45-inch card over one of narrower width are that, for a given production, better carding is obtained owing to the greater carding surface presented to

the cotton, which tends in the case of the narrower machine, if we must get the same weight through, to a crowded state of the wire surfaces, and thus the fiber is inclined to get broken and nipped according to the degree of overcrowding. This course leads to the conclusion that more 40-inch machines (with their additional attendant cost) would be required to obtain equal results than is necessary with 45-inch machines. We cannot quite understand that because one card is 5 inches wider than another that this should be used as an argument for not being able to get a light sliver without unduly increasing the draft,—we might with almost equal force use it by saying that a heavier sliver cannot be got without leading to that nipping tendency mentioned, and we should say, if it is not desirable to materially alter the draft, that the proper place to make an alteration of this character is to make a change in the weight of the scutcher lap, and not place the fault with the wider card .

To sum up, I may say that the great majority of spinners in England who put in Platt cards have them built 45 inches wide either for fine or coarse work. The advantages claimed are about 6 per cent. saving in the first cost—a 45-inch machine being only about 6 per cent. dearer than a 40-inch —a saving of 12 per cent. in strippers' and grinders' wages, floor space, belting, etc., and about 7 per cent. in power.

Of course, if a 45-inch card is not properly constructed it is better to put in the narrower machine.

As regards the lengths of frames, productions and drafts given by Mr. Rowell, they are, of course, only intended to apply to American built machinery.

THE NEW YORK COTTON EXCHANGE IN ITS RELATIONS TO MERCHANDISING COTTON

By GEORGE W. NEVILLE, President New York Cotton Exchange, New York, N. Y.

Cotton exchanges as they are known today are a development due to the loose and chaotic conditions existing prior to, and immediately after, the civil war, when practically the only means of transporting the cotton crop of the South was by sailing vessels to New York, the New England ports and to Europe.

Cotton exchanges, with opportunities and regulations for the purchase and sale of contracts for cotton for future delivery, are essential to the producer and to the spinner. The form of contract must be broad enough to care for all the merchantable or spinnable cotton that weather conditions enable the farmer to raise. If it is not, the cotton exchanges cannot and do not perform their proper service to the cotton trade, and they will not have the patronage of those cotton merchants who necessarily have to buy the cotton, regardless of grades, as it is marketed by the farmer. The by-laws and rules of these exchanges must, of course, be fair and just; and they must be published so as to be fully known to all men.

No cotton should be, nor is, permitted delivery against a sale for future delivery on a cotton exchange like New York, unless it is merchantable. "Merchantable cotton" is defined under the New York Cotton Exchange by-laws as "Cotton as gathered upon the plantations of the United States, ginned with the usual machinery, and with customary care and showing no indications of fraud." On the other hand, "Unmerchantable cotton (which shall invariably be rejected) shall be understood to include false-packed bales, bolley, threshed or machined cotton, and bales that show an excess of seed, sand or dirt, etc."

Such a contrast as this, with its clear definition of merchantable and unmerchantable cotton, provides a hedge for the purchaser of cotton bought en bloc (or, to use a localism of the South—"Hog Round") from the farmer, and it also provides a hedge for the manufacturer who has the opportunity of selling his goods for future delivery before the crop begins to move, for by means of it he can secure his quality in advance. The contract equally well gives a hedge to the cotton merchant, who sells the manufacturer his quality at the time the manufacturer sells his goods for future delivery, and turns to the merchant for his cotton.

The purchase by a cotton manufacturer of contracts for future delivery against his sale of goods for future delivery, whether he buys the contracts for future delivery on one of the cotton exchanges, or whether he buys from the spot cotton merchant that special grade of cotton and staple which he requires for the manufacture of the goods he has sold, insures him against fluctuations in the price of his raw material, and fixes, in a measure, his profit on his sale of goods. This procedure, I know, is regarded by a large number of manufacturers in this country as rank gambling and by others as speculation. I dissent from this view of the transaction, and submit that the manufacturer who does not hedge his sale of goods by the purchase either of contracts for the future delivery of cotton on some cotton exchange, or from some spot cotton merchant, is speculating on the price of his raw material and ultimately on the profit of his mill. Known results in recent years at many mills have proved this, for some manufacturers have lost not only their profits but part of their capital by following just this course.

The reverse of this proposition is also true; when a manufacturer buys spot cotton and has not already made sales of goods for future delivery to apply against his purchase of spot cotton, or does not at once sell manufactured goods or contracts for the future delivery of cotton on some cotton exchange, to hedge himself against price fluctuation, he is speculating. In my opinion the failure to observe and follow this principle is one of the contributing causes to the deplorable condition of the cotton manufacturing business today in the United States.

The contract markets for the future delivery of cotton on some cotton exchange are being used more constantly every year by our American spinners, both North and South, for the purpose indicated above, but not to the extent of their oversea competitors; and in this connection I want to read an extract from an article by one of the closest students of manufacturing conditions in Great Britain:

"We wish to emphasize to our Continental and American friends the outstanding difference between English trade and theirs. All the time there is becoming a closer connection between all the cotton trade,—Oversea Merchant, Shipper, Manufacturer, Spinner,—and the future market. The English cotton trade in all its branches is becoming an affair of 'basis,' i. e., price (of goods or yarn) relative to futures, and so the business is becoming more steady and regular, a state of affairs different from those countries where business is an affair of price alone. We are persuaded that business has been bad in America and parts of Continental Europe this season, to a large extent, because 'prices' have gone against the expectation of cotton people, whilst their European confreres have been doing a more or less profitable 'basis' business covering with futures as they are now doing for new crop booking, and taking no chances on the market for large possible profits,—or losses."

The New York Cotton Exchange has been severely criticised in the recent past, because of the number of grades deliverable on contract, and reference has been made to the certificated stock of cotton in New York as "only fit for horse collars," etc. I beg to say to you, gentlemen, that such critics did not really know the article they were talking of, nor the methods of the inspection bureau of the New York Cotton Exchange in certificating cotton for delivery against contracts of sale for the future delivery of cotton on the New York Cotton Exchange. I say this with confidence, because I know who used the cotton particularly complained of. The bulk of that very cotton was consumed by mills managed by gentlemen who are members of your own organization, and I know their mills do not manufacture horse collars.

The cotton that is delivered on contract in New York against sales for future delivery has been, is, and will continue to be, equal to the "Standard American Classification" (as exactly as experienced men can determine it), as adopted by all the American exchanges in 1874. This will be so until such time as other carefully established standards may be substituted therefor. After cotton submitted for delivery in New York is inspected and weighed, it is then classed by a committee of experts (who are not permitted to engage in any other business) and a certificate of grade is issued therefor by the inspection bureau. When shipments of cotton are made from the certificated stock, any inspection lot which may seem to be overclassed may be appealed at the time of shipment, and if there be any difference between the appeal class and the class as per certificate of grade, the inspection bureau will pay (should the appeal class show such over-classing) to the last holder of said grade certificate such difference. That is to say, the inspection bureau guarantees the class of all certificates of grade it issues.

The standard types of the grades of cotton adopted by the committee appointed, under Congressional Act, by the Secretary of Agriculture at Washington, which met in February, 1909, have not yet been adopted by the New York Cotton Exchange, because in the judgment of the Board of Managers of that Exchange, their adoption would do the farmers of the South, particularly in the Atlantic states, a great injustice. The standards adopted by the government committee were made of cotton from Memphis, Tenn.; New Orleans, La., and Houston, Texas. No cotton of upland growth was used, as the Bureau of Plant Industry (which had the standardization of the grades in hand) could not obtain samples. I was a member of this committee. In the preliminary discussions of this committee, I stated that there should be three sets of standards, viz:—Uplands or Atlantic cotton, Orleans-Gulf, and Texas. Each of these divisions of American cotton, as any man familiar with the cotton business knows, is a distinct variety of itself, having its own characteristics as regards staple, body and color. The New York Cotton Exchange asks that at least a standard be made of Upland or Atlantic Cotton, and is in correspondence at present with the Bureau of Plant Industry at Washington. We think these standard tyes of Upland cotton should be made, as, out of a total of 785,465 bales certificated in New York in 1909-10, against contracts of sale for future delivery, 481,572 bales, or 62 per cent., were Upland cotton. Under normal conditions the proportion of Upland cotton delivered on contract in New York is larger still.

Another matter under discussion with this Bureau is the making of another standard to take the place of the present New York grade known as good ordinary, which, when the standards were made in February, 1909, was not provided for, owing to the fact that the standard types, as made, were raised somewhat higher, on grades middling and below, than the standard American classification adopted in 1874. This was called to the committee's attention in Washington, but as the Congressional Act only provided for types of good ordinary and above, the committee had no option in the matter.

In normal cotton crops, this omission is not serious, but the cotton exchanges, to perform the service for which they were organized, must have their laws and rules such as to take care of all merchantable and classable cotton the farmer is enabled to raise in any kind of season. The by-laws and rules of these cotton exchanges are known, or easily ascertainable, by those in the trade, or those who are interested. Should there come another disaster such as befell the cotton trade in 1906-07, the elimination of the present good ordinary would work incalculable monetary losses to the producers, and it is the endeavor of the New York Cotton Exchange to have the contract broad enough to prevent this. This grade of cotton is spinnable and has a distinct value relative to middling, as will be shown later in this presentation.

The New York Cotton Exchange has been severely criticised in the recent past because of its so-called "fixed differences," and the New Orleans Cotton Exchange extolled because of its so-called "commercial differences." The claim is made that, owing to the fixed difference system, the New York basis middling contract price during the seasons 1906-07, 1907-8, fell unwarrantably far below the price (?) of middling on the spot. The disastrous seasons of 1906-07 and 1907-08 (so far as

grade of crop was concerned) are fresh in the minds of this audience. The storm at the end of September, 1906, followed by the storm in November, 1906, caused the lowest grade of crop in the history of the cotton trade; so much so, that by the end of January, 1907, the grades of middling and above commercially did not exist in this country, outside the stock held by or for mills. The custom of quoting middling throughout the country was continued, however, and prices were put on this grade and those above it in the various markets, which were absolutely nominal. The fact is, they could have been quoted at any price, and the grades would not have been forthcoming. This was a freak crop as regards grades, and all efforts to bring the price of the basis middling contract to the price (?) of middling on the spot, even in the New Orleans and Liverpool markets, by widening their differences on the low grades (for all of their commercial difference system), were unavailing. You, gentlemen, have had a similar experience the past two seasons when the price of raw cotton has averaged fourteen cents and better; you could not bring the price of the finished goods to a parity with the price of the raw cotton, notwithstanding all your curtailments. The New York Cotton Exchange did perform its proper service to the cotton trade in those memorable seasons, however, as it was the means of marketing for the farmers of the South 334,000 bales of those crops, being deliveries on contract, held until such time as the spinners needed the cotton, besides establishing a market basis for hundreds of thousands of bales of similar quality throughout the South.

The past three administrations of the New York Cotton Exchange have been endeavoring to ascertain the actual spinning value of grades above and below middling, as compared with middling. We have been successful in these experiments, and I believe the solution of this vexed question is in sight. I have here some samples of good middling, middling, low middling and good ordinary, American standard classification. This good ordinary is "marooned," so to speak, by the government standard. I have also the yarns made of these grades of cotton by the Lowell Textile School. The yarns made of the good ordinary certainly compare very favorably with the yarns made of the low middling and middling cotton, and the percentage of waste and cost of labor in process of manufacture certainly does not justify for this grade the very wide discount off middling which prevailed during the seasons 1906-07 and 1907-08 in markets where so-called commercial differences were in use. Similar tests have been made by the Clemson Textile School at Clemson College, S. C.; and previous to these two tests, a committee from the New York Cotton Exchange saw a test made with ten bales of each grade in one of the New England mills. So that, when I say that the omission of good ordinary cotton (as at present classed by the New York Cotton Exchange) from the government standards, works a hardship on the cotton producer, I have facts and figures, backed by years of experience in buying cotton in the South, to sustain me.

Gentlemen, this is a scientific age; manufacturing in all branches has made rapid strides. Owing to scientific methods adopted in lines of business outside of cotton, what were formerly reckoned waste products are now among the greatest sources of revenue. So much is this the fact, that it is now a familiar saying that they only lose the squeal in putting a hog through the packing house.

The majority of the members of the New York Cotton Exchange, believing in the efficiency of modern machinery, think this should be the method of making differences for grades above and below middling. Let such differences as could be ascertained along these lines by the Department of Agriculture (as a disinterested agent) be put in effect. Take the making of such grade differences out of the hands of merchants who necessarily have to be interested in the staple, and whose actions are always criticised, favorably or adversely, as interested parties may think their interests are affected, and let the machines run by disinterested parties work out these differences for the future contract markets, and let the basis middling contract price take care of the average grade of the crop.

The business of the New York Cotton Exchange during the past two seasons was abnormally large, and it developed that the inspection bureau of the Exchange needed additional facilities for the expeditious inspection and classification of cotton delivered on contracts. I am pleased to advise you that these facilities have been provided, and other changes are being considered by the board, for submission to the members, which we think will further facilitate the business of patrons of the exchange.

We are very much gratified that the two cotton exchanges in this country, in which contracts for the future delivery of cotton are traded, have been asked to meet a joint committee from this Association and the American Cotton Manufacturers' Association, to discuss certain matters to be submitted to us, and in order that there might be a thorough discussion by all parties at interest, we have also invited the president of the Farmers' Educational and Cooperative Union to appoint a committee to meet with us. It is my purpose to call this meeting early in October.

PRACTICAL CONSIDERATION IN COTTON MILL ILLUMINATION

By J. M. SMITH, Cleveland, O.

At former meetings of the Association papers have been presented describing the great advantages to be gained through proper lighting in cotton mills. While it is true that surprising results can be obtained at a low cost, we cannot expect the impossible nor results beyond reason. We may, therefore, investigate with the purpose of determining what may be accomplished and in what manner we may expect it to be done. In this way we shall be able to judge more accurately of the value of contemplated systems of lighting.

While any carefully designed modern system of lighting which is being advocated for use in cotton mills will surely be an improvement over the more or less haphazard arrangement formerly in use, and may indeed give a thoroughly satisfactory illumination, there are considerations concerned

with the practical operation of the plant which should be given attention. Further, the necessary care and maintenance of any installation should be given its share of forethought.

A good system should bring up the output during the hours when artificial light is used to about the value obtained with daylight. On the work itself the light should be ample as far as concerns the parts of the machine requiring attention. If the shuttles are not changed automatically, there should be enough light on the shuttle boxes to enable the operator to ascertain at a glance how much thread remains in the shuttle. Furthermore, daylight conditions should be simulated at night in that the entire room should be sufficiently brightly lighted to have a cheerful appearance and give the idea of wide-awakeness. This is also essential for adequate supervision.

The above thoughts would lead us to demand a system giving the effects of general illumination. Another result which is expected from good lighting is improvement in quality.

Summer made cotton goods used to demand higher prices than winter goods, their quality being superior because of the better lighting conditions under which they were made. With adequate illumination the output should be maintained at the standard quality throughout the year. To accomplish this, an even light of sufficient intensity should be thrown upon the various machine parts, where constant vigilance will detect flaws at the earliest possible moment. Anything such as broken threads, floats, etc., must be detected surely and quickly. Perhaps the largest amount of study has been given to the problem of distributing the light upon looms so that the proper amount will be obtained at the heddles, harnesses and breast beam. The design of the lighting should of course be such as to eliminate trouble from shadows caused by the operator being in his own light.

Last but not least, a good installation should give light acceptable to the operators. It should be free from qualities injurious to the eyes and, what is nearly equivalent, it should cause as little fatigue as possible. With the progress and improvement that is being made in the humanitarian features in factories, the mill owners will soon be required to give proper attention to these matters. If bad lighting conditions are allowed to continue without efforts being made to alter conditions, we should not be surprised to see legislation enacted to control the matter.

That it has not been given adequate attention, at least until very recently, is evidenced by the report of the United States Commission of Labor, which includes the following sentence, "The distribution, arrangement and amount of artificial illumination needed in these mills, from the standpoint of conservation of eyesight in workers, is a subject yet to be studied." It is certainly wrong to expect operators to do good work with anything but the very best possible light for the purpose. Uncovered, glaring light sources have no place in factories such as we are considering.

Apart from the direct injury done to the eyesight, there is the discomfort which sometimes shows itself in aversion to normal work or the sense of tiredness in the operator himself, which may or may not be recognized as due to eyestrain. This must show itself, however, in both quality and quantity of the work.

DESIGN

In this paper I do not intend to take up the matter of calculation of illumination or the actual specifications for the layout. This is the work of the illuminating engineer who is familiar with the different lamps and reflectors and their light distribution characteristics. On the other hand there are a few points which the mill operator or owner may find of assistance in judging the merits of any system contemplated. It is possible to get

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very fair results with several of the different kinds of lamps now being used in lighting textile mills. The manager who is to decide between claims or rival salesmen will prefer to apply a few tests himself.

1st. Does the installation do the work required of it even when first installed?

2d. Can the installation be maintained at its initial efficiency?

3d. Is the installation economical?

In considering economy the following items must be taken into account:

a. Initial investment and annual fixed charges:—interest taxes and insurance and depreciation.

b. Cost of renewals and repairs.

c. Cost of energy.

d. Cost of labor required for maintenance.

e. Indirect costs, such as loss of time and output, due to disturbing the operators in taking care of the lighting system, and reduction in yardage when a light unit fails.

The different systems of illumination employed

in mills may be roughly divided in two classes,—general and local. With general lighting, the aim is to produce a uniform illumination of sufficiently high intensity to permit work in any part of the room. It is ordinarily accomplished by distributed units spaced approximately in squares over the entire area to be lighted. Its advantages are, that the work may be done well anywhere in the room and that the mill appears, as a whole, well lighted, giving a cheerful, and wide-awake appearance at night.

Local illumination formerly used to a great extent for lighting looms, consists in using a single lamp and reflector to light a relatively small area. In some places the lamp has been arranged so that the operator can move it along a bar placed above the loom in such a way as to throw a large amount of light on a portion of the threads but never illuminate evenly the entire width of the goods. Its advantages are that it takes the operator's time for adjustment, and is likely to produce eye fatigue due to the sharp contrast between the light and dark areas. Further, it hinders proper supervision because of the dark appearance of the room which prevents a foreman from observing idle employes. The third system of lighting, which in a way is a cross between the first two, consists of medium sized lamps placed near the ceiling, or at least beyond the operators' reach, but located with reference to individual machines so that each loom receives adequate light.

The number of machines lighted by any one unit is somewhat a matter of choice. Large units are more economical as regards cost of wiring, renewals and labor for maintenance. Smaller units are preferable because of a more uniform distribution of light, absence of shadows and more accurate location with reference to the operator's needs. A further advantage of the smaller units is the relatively small inconvenience resulting from the failure of a lamp. If a single lamp illuminates four or eight machines its extinguishment means the idleness and loss of time of many operators and machines. With small units the desired illumination can be obtained with a lower height of suspension than with large ones. This is an important advantage in weave rooms with low ceilings.

Where Tungsten filament incandescent lamps are used, the 600 and 40 watt sizes equipped with intensive reflectors are very popular. Lamps larger than the 100 watt size may be said to have no place in a weave room; they are well suited, however, for lighting spinning rooms and other large areas.

As to reflectors for use with the incandescent lamps, there is a considerable range for choice. Proper light distribution can be obtained from either steel or glass reflectors so that the deciding factors will be considerations of a more commercial nature. Of primary importance in obtaining the required light is the efficiency of the reflector. The opaque enameled reflector will throw slightly more light directly upon the work than a prismatic glass reflector. Any reflector which may be used should be of such design as to cover the lamp enough to protect the eyes of the workers from the direct glare of the lamp filament. It is now possible, however, to obtain reflectors of either type which comply with these requirements.

In the matter of first cost, the steel reflector will be found somewhat lower. The depreciation due to dust should not be greatly different for the two types. The damage to work resulting from breakage of a glass reflector which has been located over a loom would cause considerable havoc by cutting threads in falling, would indicate from this standpoint, a metal reflector is preferable. The replacement of glass reflectors in a large factory is found to amount to 3 or 4 per cent. of the total maintenance cost. On the other hand, it is possible to determine easily when a glass reflector has been properly cleaned, whereas the efficiency of a metal type may be considerably impaired without this being easily detected by inspection. Reflectors with a smooth enamel finish can be very easily cleaned in place with a damp cloth. One of the points which has brought glassware into favor, is the fact that a very appreciable amount of light passes through the reflectors, lighting the ceiling and walls, giving a more cheerful appearance to the room. In cotton mills, however, there is so much reflection from the brightly lighted goods that a well diffused light is found in the upper part of the room, sufficient to enable repairs to be made on shafting and such other operations to be performed as require a moderate amount of light. Several photographs which I have in my possession show that undyed silk in the looms casts enough light back to the ceiling to bring out in the picture every detail of shafting, piping, wiring, etc. With white cotton goods the effect would be even more pronounced.

MAINTENANCE AND CARE

When a man has reached the decision to install a well designed lighting system in his mill to effect some of the economies mentioned above and obtain other desirable results, he must naturally consider the expense involved and the time required for the proper maintenance of the system. The machinery in the mill cannot run long without attention, and the lighting equipment likewise must not be neglected.

The largest item in the upkeep of a system using incandescent lamps is the cost of the lamps themselves. In one large industrial plant this amount is 75 per cent. of the direct maintenance charges. The average effective life of a Madza lamp depends upon the efficiency at which it operates. The manufacturers rate the lamps at three different operating efficiencies corresponding to the life figures of 1,000, 1,300 and 1,700 hours. The choice of the efficiency depends upon the price paid for power. Where this is purchased at a moderately high rate, it pays to run the lamp at high efficiency, thereby obtaining the most light for the current consumed. Even when the mill has its own lighting plant and energy is cheap, the high efficiency lamps are desirable on account of the better quality of the light.

In order that the illumination will not be materially reduced after the plant has been in operation for some time, the lamps and reflectors should be thoroughly cleaned at proper intervals. A recent investigation in a weave room where dust

made conditions as bad as will be found in practice, showed a loss of light of about 10 per cent. per month with both glass and steel reflectors. If by thorough cleaning we eliminate the loss due to dust we can keep the amount of light obtained within a few per cent. of that given by the new installations. The lamp itself maintaining its candle power so well during its rated life that the average will be well above 90 per cent. of the initial value.

The cleaning of the lamps may be done in the most obvious way, by providing one worker with necessary step ladder and washing material, and taking down each unit, cleaning and replacing it. This, however, is not an economical arrangement as two trips up and down the step ladder are required for each reflector, and the man doing the work performs several different operations in succession, which wastes time as compared with doing only one thing. Some factories have a man with a ladder put up a clean reflector at the same time he is taking down a dirty one; the latter he hands down to a helper who washes it ready to be placed clean on the next fixture. If the washing takes relatively more time than the removing and replacing of the unit, two persons may be employed at washing. Another arrangement very desirable in a large factory is to provide a truck holding an extra stock of clean reflectors. These may be put up as the dirty ones are removed to be taken from the room for cleaning.

To summarize then,—. Decide to light adequately. 2. Choose a system that is practical as well as correct in theory. 3. Take care of it so that it is always in shape to produce the results wanted. Under such conditions you cannot help find good illumination your most trustworthy helper and profit producer.

INTRODUCTION OF CHEMICAL BLEACHING INTO THE UNITED STATES

By A. M. ROBERTSON, Lakewood, R. I.

While the bleaching of cotton or linen fabrics by being dampened and spread upon the grass for periods reaching from six to twelve months is a domestic handicraft whose origin is as prehistoric as that of weaving, yet the acceleration of the process by means of chemicals outside of that of lye made from wood ashes, is a relatively modern process, in which there have been fundamentally but two steps, one being that about ten years after the discovery of chlorine in 1774 by Scheele, a celebrated Swedish chemist, it was applied, near Glasgow, to the bleaching of cloth, notably in 1786, by James Watt, the great inventor of improvements on the steam engine, and at Aberdeen and at Manchester by others. This use of chlorine was modified by the form of its application in water or in compounds of lime up to about 1800, and this remained fundamentally the method of bleaching, with improvements in the method of handling the cloth, for the purpose of producing more uniform results and especially the rapidity of production, until thirty years ago when compounds of peroxide of hydrogen were first introduced for the purpose.

As the published accounts attribute the establishment of chemical bleaching in this country as long after the correct dates and by different persons, the following is submitted as a record of the historical facts: One of the anomalies of commercial history is that the introduction of chemical bleaching into this country was one of the fortunes of war through the capture of a British sailing vessel bound for Philadelphia, during the war of 1812 by an American privateer, named the Yankee, under the command of Captain James DeWolf of Rhode Island. Two of the passengers from Renfrewshire, Scotland, on the captured vessel were Duncan and Daniel Wright, brothers, and when the captain of the privateer learned their occupation and that they were bleachers and dyers and acquainted with chemical bleaching, he said that they were just the people wanted in this country

A. M. ROBERTSON.

as all the dyeing was done in kitchens and the bleaching on the grass. He took them ashore at Bristol, R. I., and secured for them work at the Arkwright factory in Dighton, Mass., in which he was interested.

Duncan Wright, the elder of the two brothers, was born in Delmarkley, Argyleshire, Scotland, in 1769 and died at Tewksbury, Mass., January 26, 1836. He learned the trade of chemical bleaching in his native town and lived afterwards at Arklestone near Paisley, Scotland.

When the Peace of Ghent closed the war of 1812, after three years' duration and rendered the passage across the Atlantic safe, Duncan Wright sent for his wife and three sons, Peter, Alexander and John, who came to Boston in 1815, and he went from Dighton to Smithfield, R. I., where he worked for two years, laying the foundations for what was later known as the Allen Print Works. In 1817 he went to Waltham and established a bleachery of his own which he sold out to the Boston Manufacturing Company in 1820, where the Waltham Bleachery is conducted to this day.

In 1820 he went to Medway where he established a bleachery near the Charles River, where he re-

mained five years. Immediately after, he had a bleachery for a short time on Milk Row, Boston. About 1825 he visited Fall River where, in cooperation with Andrew Robeson, and his son, both of New Bedford, the Robeson Print Works were started, which went out of existence some time previous to 1884.

In connection with these bleacheries, dyeing was done in several, and perhaps all of them. These brothers left sons who were established in various textile works, notably making the first ingrain carpets in this country, at Medway, Mass., and afterwards at Lowell where Alexander Wright (born May 4, 1800, died June 7, 1852) and Don C. Wilson, a weaver from Paisley, Scotland, established what was then known as the Lowell Carpet Company, now the Bigelow Carpet Company.

Later in life, at the age of sixty years, Mr. Wilson established a cotton manufacturing plant at Durango, Mexico, and six years afterwards retired to his farm in Illinois and completed his life in Lowell, Mass., at an advanced age.

Peter Wright (born 1798, died 1886) was connected with the bleachery at Medway, Mass., and afterwards at Newton, Mass., and Saco, Me.

John Wright (born 1802, died 1870) was perhaps the ablest bleacher and dyer in the family, and at one time was engaged in the manufacture of worsted yarns at South Lancaster, Mass.

Daniel Wright, the younger of the two brothers who came to this country in such an adventurous manner, was born in Scotland about 1778 and died in Ohio, March 14, 1849. He was associated with his brother in establishing and operating the chemical bleacheries, dye works and print works mentioned above, and was most active in the Robeson Print Works at Fall River, Mass. He had three daughters and one son, Patrick, who lived at Fall River and followed the calling of his father, becoming the manager of the Robeson Print Works.

This brief account of the facts and persons connected with the introduction of chemical bleaching into this country is submitted as a record gleaned largely from family papers in the possession of the writer especially as the usually published statements on the subject ascribe this introduction to the work of others and at much later dates.

TEXTILE EDUCATION FROM A MANUFACTURER'S STANDPOINT

By EDWIN H. MARBLE, Worcester, Mass.

Industrial education has been reported upon by commission and by individual. Several manufacturers have written their views on the subject, and it seems that all that we can offer at this time is a resume of several previously prepared articles with some notes upon the same that may be of greater or less value to the members.

Confining our study to the textile field we find the sources of industrial education to be the correspondence school, the mill apprenticeship and the textile school.

The correspondence schools have prepared courses in most, if not all, the different departments of textile manufacture. The theoretical construction from the text book, combined with every day application of the same by the textile worker, has been the means of elevating many of those who are dependent upon this industry for their livelihood. Besides the cooperative feature of text book instruction and functional application the student will acquire splendid habits of study and observation, under the indirect guidance of an instructor whom he knows only by the pen signature upon his examination paper. Important a place as this method has, in our educational system, it has a serious drawback. It lacks the personal contact and inspiration of the leader of thought and action who is in charge of the student's work. This has been and always will be the greatest element in education and in very few branches of industry is it more in evidence than in that in which we are interested. One of the favorable points in this method, is the widespread influence of its courses,—hamlets and factory villages far removed from textile schools, are reached by it and individuals who are not in a position to attend even the local schools, are given a knowledge of the principles of the industry.

As this correspondence course is the latest form of imparting instruction, the apprenticeship is the oldest. This form of instruction is almost a thing of the past. Changing conditions have rendered it somewhat undesirable to the manufacturer, and we, as well as those engaged in other branches of manufacturing, are seeking for a substitute for it. If only for its historic value, let me introduce a copy of part of an indenture paper, that shows how men of only a few years ago, obtained their knowledge of the mysteries of the making of cloth. That we are today somewhat deficient in this knowledge is evident.

(Copy.)

This indenture, Witnesseth, That John Smith, aged 17 years, 10 months, at the ensealing hereof, by consent and advice of his Mother, Jane Smith, hath put himself, and by these presents doth voluntarily and of his own free Will and Accord, put himself apprentice to James Doe to learn the Art, Trade and Mystery of carding work and dyeing cloth, and after the manner of Apprentice, to serve from the day of the Date hereof, for and during, and until the full End and Term of three years, one month, four days, next ensuing; during all which time, the said Apprentice, his said Master faithfully shall serve—his Secrets keep—and his lawful Commands everywhere readily obey—He shall do no damage to his said Master—He shall not waste his said Master's Goods, nor lend them unlawfully to any—He shall not commit Fornication, nor contract Matrimony, within the said Term—At Cards, Dice, or other unlawful game, he shall not Play, whereby His said Master May have Damage with his own Goods, or the Goods of others. Without license from said Master, he shall neither buy nor sell: He shall not absent himself Day or Night from his said Master's Service without his Leave; nor haunt Ale-Houses, Taverns or Play-Houses; but in all things behave himself as a faithful Apprentice ought to do during said term. And the said Master shall use the utmost of his Endeavors to teach, or cause to be taught or instructed the said Apprentice in the Art, Trade or Mystery of Carding and cloth drep-

ing, and procure and provide for him sufficient Meat, Drink, Lodging and Washing, fitting for an Apprentice during the said term of three years, one month and four days, the said Master doth further bind himself to pay the said apprentice twenty-five dollars yearly, the time of payment to commence the first of March, one thousand eight hundred and twenty-four and end with his apprenticeship. Likewise to send him to a lawful English school at least one month each year. And at the expiration of his apprenticeship to furnish him with a Bible.

And for the true Performance of all and singular Covenants and Agreements aforesaid, the said Parties bind themselves each unto the other firmly by these presents.

An official of one of the larger woolen companies, operating several different mills, told the writer that the best returns they had received for money expended, resulted from taking a good carder away from his mill position and sending from mill to mill, spending such time as was necessary with each overseer and endeavoring to instruct them in the handling of their respective rooms and also aid them in solving the problems that from day to day are brought to their attention. Not a correspondence course, not a regular apprenticeship, but a personal-instruction in card-room methods.

A prominent machine builder has employed a traveling instructor for several years, visiting various mills in which his machines have been installed. Quite a number of employes who have been instructed by this man are profiting by the same.

In a few instances we find young men who have entered the employ of a cotton or knitting mill, and beginning with the time that the bale is received, are working along through the various advancing processes, determined to obtain a practical knowledge of the work. How far the different overseers with whom these young men are brought in contact are qualified to impart a thorough knowledge of the department entrusted to their care we cannot say, and it is to these in a large measure that the apprentice must look for his advancement. Knowledge of the "how and why" of each process is often difficult to obtain from the ordinary overseer. A few of our larger mills have it in their power to carry out this system with very great satisfaction, both to the student and to themselves. Possibly a study of the methods adopted by Mechanical Trade Schools would suggest a solution of this apprenticeship question.

Apprenticeship was considered in earlier days apprentice system and the part-time plan is used to advantage as a systemized course of instruction by which to give the youths a complete mastery of the trade. It was the imparting of a knowledge of each distinct process of manufacture, under the watchful eye of a master workman. It was a very decided form of vocational education, but we are inclined to believe that some of the "whens and whys" of the textile industry were omitted in the older days because of the limited environment and the much more limited character of the output of a mill. Many of those earlier apprentices became specialists in that particular class of fabric which was the product of his Alma Mater.

The remaining source of instruction is by the textile schools. Let us make a closer study of these and their results. For practical deductions we will separate the work into two sections, the elementary and the advanced courses. By the elementary course we would refer to that which comes in direct contact with the mill operator.

With the gradual introduction of automatic machinery much of the old time personal skill is not called for, but expert machine tenders are in demand. If the operator is a spinning frame tender, his advancement is because of his beginning a better spinning frame tender. We find this is true in all departments. The operator who can keep his or her machines running constantly, and whose output is superior to that of a less skilled attendant, is the one who has the preference. The evening classes of our textile schools are one of the best illustrations of this method of imparting industrial education. Consider the class of pupils that present themselves for enrollment at the opening of each school term. Take this untrained class often unfamiliar with the very simplest elementary branches, give them the encouraging guidance of an interested instructor and observe the splendid results. Some of the most enthusiastic textile people I have ever met were at the graduation of these same scholars. Of these, some are never going to be master workmen in the different branches of our industry, but most of them are going to be better workmen. One of the highest executive officers of the United Textile Workers has well expressed himself—"In a word," he writes, "our youths should be taught the higher technique of our industry, so that they may combine taste with more perfect workmanship and besides being of more value to themselves, they will be of far more value to whoever may employ them. Such a training is being given in our evening classes and the results are most creditable,—a more valuable weaver, a more valuable spinner, and above all a more valuable all around young man."

The second department of the textile school remains to be considered. The results of the instruction imparted in the advanced grade is best studied by an examination of the positions occupied by the graduates of the different institutes. These graduates are usually found in one of the following groups: first, the machine operator who has acquired a more than ordinary skill in handling his machine and can impart that information to others; second, the designer or originator of new organizations, either in fabrics or in process of manufacture; thirdly, the expert investigator or systematizer; and fourthly, the executive leader and director; a fifth group is rarely met with, yet it is as important to the industry as any of the other four. I refer to the master workman, be he the carder or spinner, the expert wool-sorter or practical finisher. These cannot be produced in the confinement of the school building, but are the joint product of that institute and the mill itself, and are we not in need of as many of these, this fifth group, as we are of all the other four combined.

We have all noticed the improvement that these textile graduates have made since they, as individuals, entered the institutes as candidates for a position on the platform on Commencement Day. Most of them were already provided with a parchment, which suggested some of the various processes through which they had passed during earlier school days. Considerable mathematical treatment and some language culture had been applied. This latter, however, was somewhat unevenly distributed between foreign and domestic. Its value is questionable. Perhaps a little manual training had also been imparted; as, several other branches have been introduced into the student's curriculum, enough of each of these to show the undetermined nature of previous training, if such we would call it. Now any mill man receiving an assortment of fibers of such a character, and which he was expected to transform into a suitable commercial fabric, would have discarded the entire package of once. Yet it is only a fair examination and description of the material from which the Textile School instructor is expected to fill up the vacancies that time and trade expansion are making. This may seem a very serious criticism of our elementary school system, but we do not think it is wholly uncalled for. When a skilled carpenter needs a new hammer handle, he does not take the first stick off the wood pile, but carefully selects that piece of raw material that he considers best suited to be transformed into the handle that is to be a link in the application of the propelling force in his daily work. Many of our common school educators are ignorant of what they want to do, what they ought to do and what they might be able to do. Many of our manufacturers have taken very little interest in the elementary school work, and are apparently so engrossed with their own manufacturing plant that they fail to notice the results that are being produced in some other manufacturing institute, whose product this same manufacturer must use in his own establishment at some later day. Would it not be well for us to have a greater interest taken by the manufacturer in all civic affairs, especially those in which he can greatly increase their practical value, by assisting the instructor to develop theories along lines that will be elementary to later practical applications. The technical education that will be of the greatest benefit to the textile industry must have its foundation laid much earlier in the school life than at the age at which we find the youth or maiden applying to the textile schools for the finishing touches to be given to his or her public educational training. Our textile schools, considering the quality of the entering class, and the limitations noted, are doing a grand work for our industry.

Besides the criticism already made, that applies indirectly to these schools, let us present one other. Why do we have so small a number of graduates that are capable of taking a master workman's position. This is a very direct and also a very important question. Are the ten or twelve schools along our Atlantic Coast in a position to supply the call that is increasing every day, not alone a call for designers, dyers, or executives, but for master workmen, who like, the apprentice of old is learning, by doing things; those things including the handling of the fiber through all the processes, for it is by becoming intimately acquainted with the material itself that progress is made.

THE ENFORCEMENT OF CONTRACTS OF SALE

By WALTER S. NEWHOUSE, of the New York Bar,
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There appears to be at present a widespread and effective movement under way which has for its purpose the abolishment of that unjustifiable cancellation of orders which has been from time immemorial the peculiar and distinguishing mark of the woolen and cotton trade. So well established has this practice become that it has almost attained the force of a custom, and when a mill or commission house receives an order it is always with the expectation (generally realized) that it will be cancelled in whole or in part at the buyer's option. In other words, buyers will give orders far in excess of their actual requirement with a feeling of security that if the market actually goes against them they will not be expected or compelled to live up to their contract. Such a condition of affairs is intolerable, is unknown in other trades and seems to be confined entirely to the wool and cotton industries, not so much in the sale of the raw article as in that of the finished product.

The reason for its existence it is not the purpose of this article to discuss. What all are seeking is a means for an abolishment of the evil.

In the writer's belief the only way to stamp out this practice is for the manufacturer or commission merchant to insist upon the literal performance of the contract of sale and this he is not in a position to do unless he knows his rights and "knowing dare maintain."

In order that there shall be an enforceable contract there must be parties competent to contract, mutual assent, a well-defined thing and an agreed price. Lacking any one of these elements the contract is not enforceable. The minds of the contracting parties must meet and agree on all these essentials and the law will not assume from one party's silence that he acquiesces in the proposal of the other. The intention of each party to be bound must be expressed.

Part of our inheritance from the English law is what is technically known as the "Statute of Frauds," which with a few exceptions is in force in all of the states of our Union. Its purport and effect seems to be but little understood in the commercial world, in the making of whose contracts it plays so important a part.

The statute in brief provides that no contract for the sale of merchandise of the value of $50 or over shall be valid unless there has been part delivery and acceptance or something paid on account, or unless there is a memorandum thereof signed by the party to be charged.

This memorandum or writing need not be in the shape of a formal contract or agreement, it may take the form of letters or correspondence passing between the parties, but this correspondence must contain either directly or by reference all of the material terms of the contract, such as price, amount, date of delivery, etc. The writing, how-

ever, which sufficiently identifies the contract, must be signed by the party to be charged, in most litigated cases the buyer, and it is thus apparent that the mere sending of a "copy of order" to the buyer is not of any avail and does not of itself create a contract unless the copy of order or memorandum of sale is signed by or its receipt in some other manner admitted in writing by the purchaser. The forwarding by a mill therefore of the "uniform sales note," to which reference has been made and which purports to embody the completed contract, will therefore not of itself create a binding obligation upon the buyer unless he accepts the same formally in writing or in some correspondence acknowledge receipt thereof and accedes to its conditions.

There seems to be among the trade a marked disinclination to request a purchaser to sign an acknowledgement of the giving of an order, presumably on the ground that it may possibly denote a doubt as to the buyer's good faith. Such an argument does not seem tenable. Experience has shown that one who intends to live up to his obligations does not hesitate to commit himself to writing, and the purchaser who would decline to sign an acknowledgement of order on the ground of offended dignity would in the majority of cases bear watching.

Where there has been a part delivery and acceptance of the goods the case is not within the prohibition of the Statute of Frauds even though there is no memorandum in writing of the transaction; but the purchaser must always have reasonable opportunity of inspection, and if he receives the goods and after inspection rejects them there will be no such acceptance on his part as will prevent him from repudiating the entire contract should he so desire.

Under such circumstances the question will still be, has there been created a contract enforceable in law under which the seller can compel acceptance.

There is an exception to this rule in New York and in many other jurisdictions which follow the decisions of that State, and that is in the case of goods made to order and not in existence at the time of the making of the contract. In such a case a verbal contract for any amount can be enforced without any memorandum in writing or any part delivery and acceptance. In Massachusetts a different rule prevails and if the order is over the value of $50 and is for a class of merchandise such as the seller is making in the ordinary course of his business, the contract is still within the prohibition of the statute and unenforceable unless there is a written memorandum signed by the party to be charged or, payment or partial delivery and acceptance.

This question of acceptance of goods under the contract is a most important one and one which it seems to the writer is not sufficiently dealt with and provided for in the uniform sales note.

The law gives the purchaser a reasonable time for inspection of goods and rejection, and that right cannot be taken away from him by any custom of the trade. What is such reasonable time is a question of fact in each case unless the delay is so long as to be unreasonable as matter of law.

Where the defect in the quality of the goods is one which is discoverable on inspection, the buyer must complain at once; where however the defect is one which will not appear until the goods are made up and used, or where the sale is by sample, there is implied in the law a warranty that the bulk of the goods is like the sample, or that the goods are merchantable, free from defects and suitable for the purposes for which they were bought, and such warranty will survive the acceptance of the goods.

So also there are many instances where it is impossible or impracticable for the purchaser to make an immediate inspection, as for instance when goods are to be held at the mill for shipping instructions or where they are to be shipped direct to the finishing works; in all such cases the particular facts will govern the rights of the parties and no formal contract, however skilfully drawn, can in the writer's estimation cover all of such contingencies.

What is the solution of this problem, is it aggressive litigation? No, not if that can possibly be avoided, because experience has shown that the submission of commercial cases to the average jury is highly unsatisfactory to both parties.

It is the submission of differences to a board of arbitrators or courts of commerce, under an agreement by which parties submit all question in dispute to the judgment of such bodies? Again no, because neither side is ever satisfied with the decision of such a body, and further because an agreement to leave all matters in dispute to the settlement of a board of arbitration is against the policy of the law and void.

The only solution in the writer's belief is education and cooperation. Education, by acquainting and familiarizing buyers and sellers with the salient features of the law of sales, how to create a valid contract, what their rights are under such contract and what their remedies are in the event of its breach.

Cooperation, not alone of manufacturers with manufacturers, and of buyers with buyers, but a cooperation of manufacturers, middlemen, selling agents and buyers; the result of which would be the bringing about of a more perfect understanding between buyers and sellers as to their respective rights and liabilities.

To effect that result is it not possible and is it not indeed practical to bring into being an association composed of both buyers and sellers of merchandise, of which association, manufacturers, members of commission houses' sale agents, jobbers and ultimate purchasers will be members, and in which association committees composed of men representing all classes of buyers and sellers, purchasers, consumers and middlemen will cooperate in establishing and maintaining a uniform system which will do away with the present state of uncertainty, and by bringing about a mutual understanding will create order out of the present chaos.

In such an association all classes of trade will have confidence. They will feel that it is not the organ of any one class, but that on the contrary it is a representative body safeguarding equally the rights of buyers and sellers; and when honest disputes are left to committees of such an association for determination, its ruling will be willingly heeded and cancellations of orders, instead of being the rule will, it is believed, become the exception.

ALIGNMENT OF SHAFTING AND MACHINERY

By GEORGE W. LOGGIE, 7 Water Street, Boston, Mass.

In presenting the subject of line shaft friction and machine vibration, it will be necessary to speak very definitely and in detail of a new method and of its devices for aligning and leveling shafting, setting machinery and general shop surveying, for it is only because of this method that we are enabled to present the facts which make this paper valuable. An absolutely new standard of friction has been established for us especially, on line shafting. The purpose of this paper is to emphasize this new standard.

GEORGE W. LOGGIE, TREAS. KINKHEAD MFG. CO.

The study of the causes and magnitudes of friction losses and the laws governing their production is, next to the theory of pure mechanics, the most important study in relation to the transmission of power. Someone has said that "friction is the highway robber of mechanical energy." We frankly believe that the most flagrant abuse of power in the average plant can be charged to line shafting. The neglect of this detail and the indifference of many mill managers to this great fundamental of all manufacturing is almost criminal when one considers not only the money wasted because of it, but the tremendous influence it has on the quality and quantity of the output. Perhaps this can be traced to the common mistake of considering the initial outlay rather than the ultimate gain in expenditure resulting from the means adopted. We, therefore, reemphasize the fact that power transmission and power generation stand side by side,—the twin problem of any factory.

AMOUNT OF WASTE FROM FRICTION

After all possible economies have been adopted in the first production of power, it has to be transferred to the point where it is to be used. It is a firmly established fact that heretofore from one-quarter to two-thirds of the power generated is used on the shafting and never reaches the point where it is required. Friction on shafting is always a resisting and retarding element. It will vary in proportion to the pressure on the surfaces; that is, increasing the pressure increases the friction. The selection of lubricant will affect this, but the main problem is to relieve this pressure. This pressure is, of course, due to inability to accurately align and level the shafting so that the perfect relation of one box to another permits its running true without resistance. Turning shafting requires at best a considerable amount of power, and a poorly hung line requires more coal than is usually realized.

PRESENT STANDARD THIRTY-FIVE PER CENT.

A very careful investigation and numerous tests establishes that the average loss of power due to friction is about 35 per cent., a startling fact. The smallest friction in a textile plant that has come to the writer's notice, is 29 1/2 per cent., the largest, 52 per cent. It is a very common experience to find in these plants friction loads of 40 to 42 per cent. Of course this condition directly affects the cost record of operating, and recent tests also tend to prove that it affects the output materially. This friction is not altogether due to the shafting, that is, the pressure at the boxes, but is also due to the tension of the belts. This includes all belts running on idlers, but the principal amount of this friction can be traced directly to the result of the present antiquated and insufficient method of aligning and leveling the shafting.

LUBRICATION

It is a significant fact that more has been said on the subject of lubrication than on any other phase of this question, as if proper appreciation and application of the lubricant would very largely alleviate the difficulty. Lubrication holds a very large place, for the coefficient of friction with the surfaces efficiently lubricated is from one-sixth to one-tenth that for dry or scantily lubricated surfaces, but it is the pressure on the bearing that needs attention. All are familiar with the commonly accepted method of aligning and leveling shafting. Almost every authority on the subject contains this paragraph: "For aligning a shaft, a level (meaning a common spirit level) and a fine grass or silk line are indispensable." The only exception to this is that suggesting the use of the plumb bob. When one has to go through walls or around obstructions the use of the hydrostatic level is recommended. The latest authority published in 1910 begins with these words: "Stretch a fine grass or silk line." Referring to the level it says, "Hang leveling hooks from shaft with straight edge on hooks, place spirit level on straight edge." A few up to date plants vary the above by using a transit or architect's level instead of the spirit level to obtain their leveling line. It is a fact conclusively proven that no line over 50 feet in length can be accurately adjusted

by this method. Where this method has been used on lines 150 feet or over, a variation of one and one-quarter inches in level and alignment has been found, and a variation of half an inch is very common. This is not due to the carelessness of the mechanic or millwright, as one might quickly suppose, for with this method the cleverest millwright living could not do a perfect job. The very smallest variation found out of hundreds of tests on long lines has been one-eighth of an inch, and this is considered a real good job. The fault is not with the millwright but with the tool; a perfect job is an impossibility under this method. This explains clearly why the standard of friction —that of 35 per cent. quoted above—is accepted today, and this is really an excellent average. A very great majority of mills will exceed this average. Where this average is maintained, good work has been done by the millwrights. Can this friction be reduced, and is there any improved method which will remove any excuse for carelessness or indifference on the part of the millwright? To both questions we answer yes, and this leads us to describe the following method and device for doing this work. We speak of this particularly as we know of no other which gives the same results.

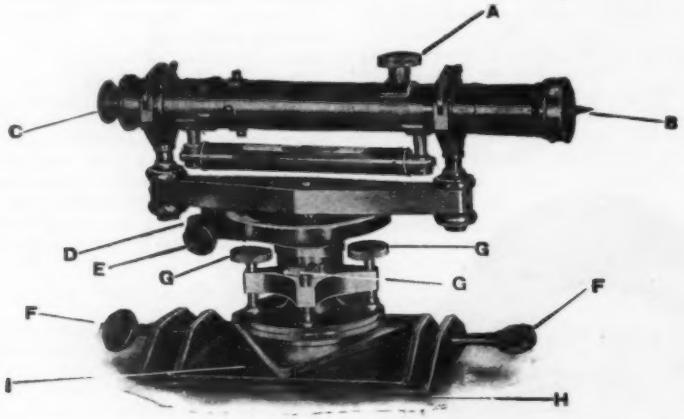

FIG. 1.

THE PRESENT STANDARD OF FRICTION EXCESSIVE

Until recent years, the friction losses of well constructed stationary engines amounted almost to 15 or 20 per cent. of the total power developed, but to such a state of mechanical refinement has modern engine construction been brought that the frictional horse power often amounts to only 2 or 3 per cent. This device does for operation of shafting what improved mechanics have done for the engine. It enables us to align and level shafting with such perfect accuracy that what was considered a fair friction load, namely, 35 per cent., is now considered extremely excessive. Using this device the new standard calls for a friction load of not over 20 per cent. This is a safe and conservative figure, for we could claim a standard of 15 per cent. and maintain it. This low standard,

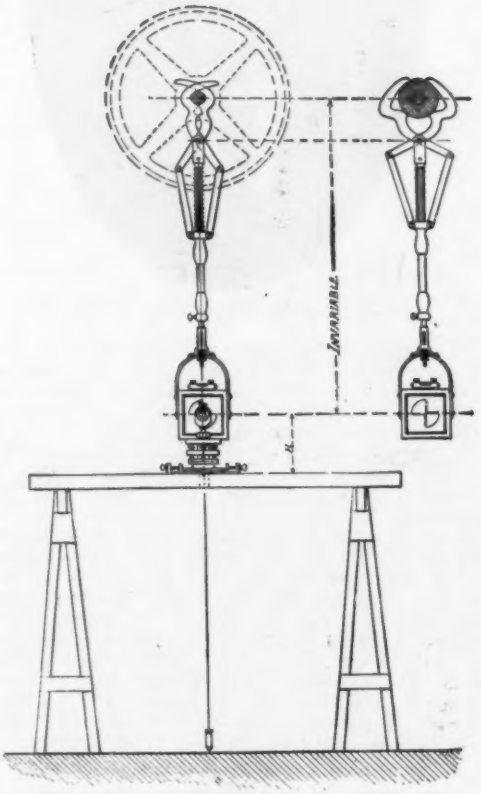

FIG. 2.

however, involves not only close to ideal conditions in the plant, but such an arrangement of machines, pulleys and belting, together with such personal supervision as perhaps it would be unreasonable to expect. With this device any shafting of whatever length and of varying sizes, irrespective of the location of the shaft and the obstructions under or around it, can be so adjusted that the boxes will bear perfect relation to each other, all pressure on the shafting being removed and the only cause of friction being the weight of the shaft in the box and the pull of the belt.

We do not propose to deal at all with the physical characteristics of materials or of special bearings, but quote only from our general experience and conditions as we find them in the various plants, illustrating the workings of the device, and showing its ability to detect improper conditions.

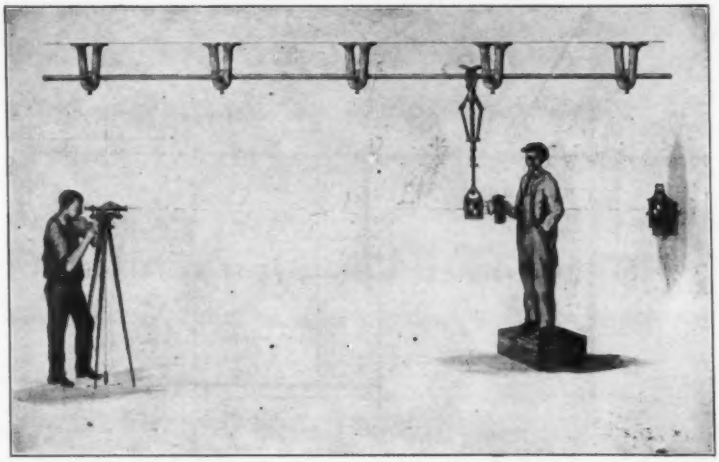

FIG. 3.

THE NEW DEVICE

The device consists essentially of a special architect's level built particularly for indoor and shafting work.

A self-centering target which is hung from the shafting by an ingenious jaw clamp so constructed that it not only invariably finds the center of the shafting but remains invariable irrespective of the change in size of the shafting and variations due to change in diameter (Fig. 2) and a fixed or stationary target used as a check to insure uniform readings. The portable or moving target is capable of such arrangements and adjustments as to enable the operator to work on any of the various kinds and positions of shafting.

In Fig. 3 we show a simple arrangement, an assembling of the outfit for ordinary use on overhead shafting, the position of the level, the portable target and the back target. The two targets are transparent, the illustration showing the use of the magnifying lamp for night work, which makes it unnecessary to light up the factory.

Fig. 4 shows the fundamental principle of using the target with offset for the purpose of getting around an obstruction whether a machine or belt. Various arrangements of this offset feature, will enable the operator to overcome any condition or obstruction he may find.

The merit of this system is based upon the portable target and its centering features because of its invariable relation to the line of the shaft. Each reading presents the actual condition of the hanger both as regards the alignment and level at one operation. The crosshairs of the architect's level showing on the face of the target indicate the two positions, whether the shafting is high or low or out of alignment. The boxes can be adjusted to one one-hundredth of an inch if desired and a reading of any length shafting can be made. All arrangements of the targets provide for the accurate locating of the engineer's level in positions convenient to the operator. The method is simple, absolutely accurate and economical; so simple that any ordinary millwright can use it, so accurate as to insure the reducing of an ordinary friction load anywhere from 10 to 50 per cent., and so economical as to enable two men to do in an hour's time, whether night or day, more actual work than four men can do in four hours' time under the old method.

Another interesting and unique feature of the outfit is that with it shafting in motion can be aligned accurately.

EXPERIENCES AND TESTS

We now present some definite experiences showing the value of a scientific method of surveying shafting. We will eliminate formulas or mathematical problems of any kind, and in a simple,

comprehensive way, explain through this series of conditions what is liable to happen in any plant.

Fig. 4 shows a condition that existed in a plant in the city of Worcester, Mass. This is a main line shaft 226 feet long in the basement. On this shaft, the main drive was on one end, the shafting passing through four brick walls. It was so situated as to make it impossible to align it from end to end by any other method than that employed. A survey of this shaft was made at the instance of the superintendent, who appreciated the fact that something was wrong as shown by the power consumption card. Setting up the instruments a reading was taken, showing a sag of 2 1/4 inches in about 25 feet. The shaft was also very badly out of alignment. Investigation showed the fact that about eight months previous there had been an accident to the building when temporary repairs had been made, but inaccessibility and a pressure of business furnished the excuse for setting up the shaft temporarily in what proved to be a dangerous position. Adjusting to perfect alignment and level resulted not only in the reduction of power but in more efficient work on all the machines.

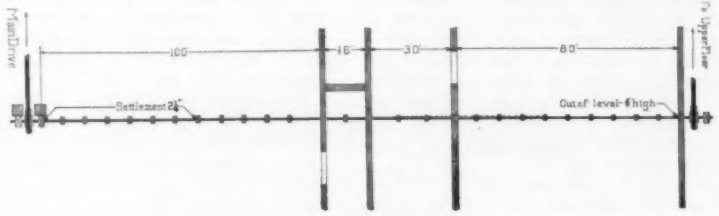

FIG. 4.

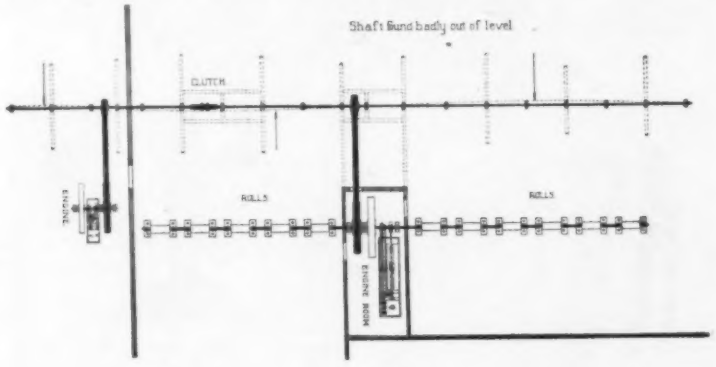

FIG. 5.

Fig. 5 shows another important condition. This was in a factory in the city of New Bedford, Mass., on a main line running over cross-beams of trusses 22 feet from the floor. The shafting also went through one brick wall. An engine indicator card revealed a very decided increase in friction, which ultimately resulted in the blowing out of a cylinder. When this accident occurred the writer was asked to visit the plant and to survey the shaft. In this particular case the line was 250 feet long ranging from 2 3/16 inches to 6 3/16 inches in

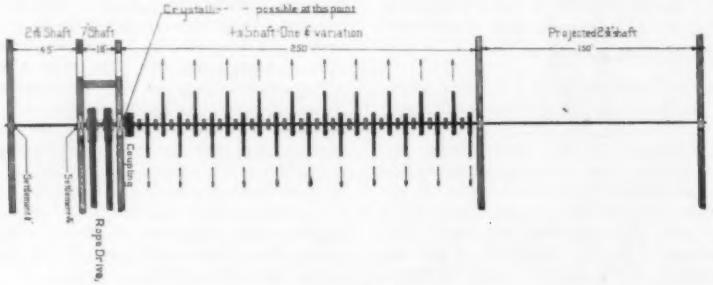

FIG. 6.

diameter and had not been aligned for several years. It was connected with two engines, a clutch being used when supplementary power was

Fig. 6 illustrates another condition on a shaft that was ideally planned and the drive of which was ideally executed. This was a shaft over 300 feet

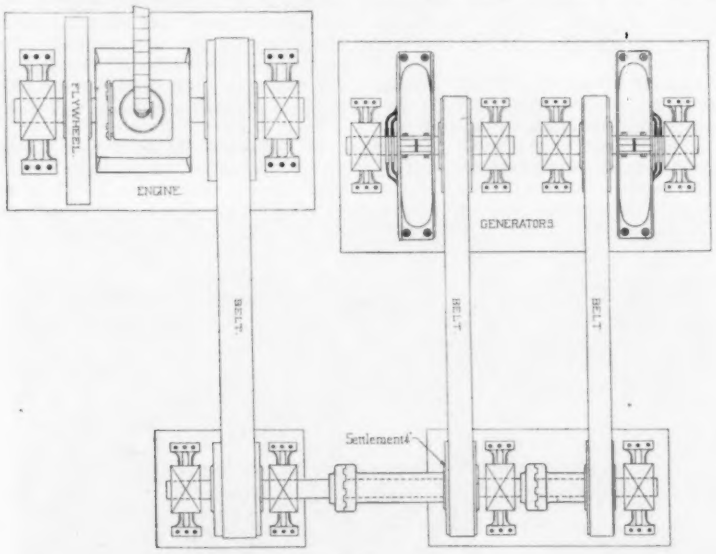

FIG. 7.

needed in case of an overload. A reading was taken in two hours showing a variation of 2 1/4 inches. What would ordinarily have been at least a two days' job under any other method—and a

long to which was to be added an additional length of 150 feet. The main drive was 7-inch and the remainder of the line 4 3/16 inches. It was intended to add to this a 150-foot length. It was ad-

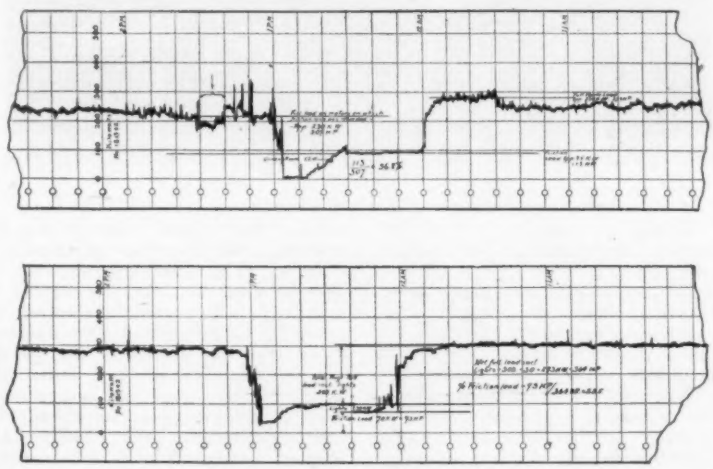

FIG. 8

most imperfect one on account of conditions—was accomplished on a Saturday with entirely satisfactory results and a decided decrease in friction. The reader may feel that this was neglect on the part of those in charge, but the mechanic stated that without a scientific method of doing the work it would have been impossible to find the cause.

mitted that this shaft would have broken but for the timely use of this outfit, due to a settlement of 1 5/16 inches. This case is only one of the conditions that may cause a shaft to crystalize and break. The main portion of the line ran almost true, the greatest variation being one-fourth of an inch, but the arrangement of the pulleys acted

upon the shaft the same as a large fly wheel, and the settlement coming on one end near the rope drive, crystalization would have taken place and sooner or later this shaft would have broken, causing considerable expense. This condition could not have been detected by the old method of working.

Fig. 7 shows a condition found in a silk mill in the northern part of New York state. It was discovered that under their buildings a spring had started, causing a settlement of the walls, but at the time of making repairs a satisfactory adjustment could not be made. Although one of the best millwrights available handled the job, excessive friction was apparent at all times. The 7-inch driving shaft in the engine room had settled, and as the dynamos were driven from a sleeve shaft connected with two clutch pulleys, it was difficult, and as it turned out, impossible to locate the inaccuracy with the old method. A thorough reading not only as to the alignment of the shaft but the relative position of the pulleys was made in three-quarters of an hour and the line adjusted in another three-quarters of an hour with the immediate result of the releasing of the friction. In the same plant a shaft 350 feet long constituting the main drive through the factory was found to be out 2 3/4 inches owing to settlement caused by the spring, and naturally showed also excessive friction. A marked condition noted in this particular plant was that owing to the excessive friction on the main drive and on the driving shaft the run had become very irregular, which showed in marked irregularity on the machines and defective output. This irregularity and vibration on the machines was entirely removed by surveying and adjusting the shafts.

Fig. 8 is presented for the distinct purpose of showing in a concrete manner the difference of friction between this scientific method of aligning shafting and the old method. This plate represents two power charts, the one taken before the shafting was aligned, the other after.

ELEVEN HUNDRED DOLLARS A YEAR SAVED

In this case the point was distinctly made that the engineering corps was particular about the shafting and that it was a rule of the plant to have it gone over twice a year; that none of the shafting was large, all being 2-inch and under, and that special boxes took care of the vibration of the shafting, and therefore practically eliminated the friction. The chief engineer was asked what his friction load was and he replied "normal." He was pressed to explain the term "normal," and he replied, "35 per cent." No amount of argument could convince him as to the possibility of reducing this friction load, and it was ultimately determined to make an actual test in the plant to show what if any merit his claims had; that small shafting running in roller bearer boxes carefully aligned by the old method kept friction to a minimum. The guarantee was made that the friction would be reduced at least 10 per cent. Twenty-five hundred and ten feet of shafting of 23 different lengths, the shortest length being 32 feet and the longest 360 feet, was aligned and leveled in 52 hours, working evenings, and for the first time in the history of this plant it was not necessary to shut down a department or lose a minute's run-

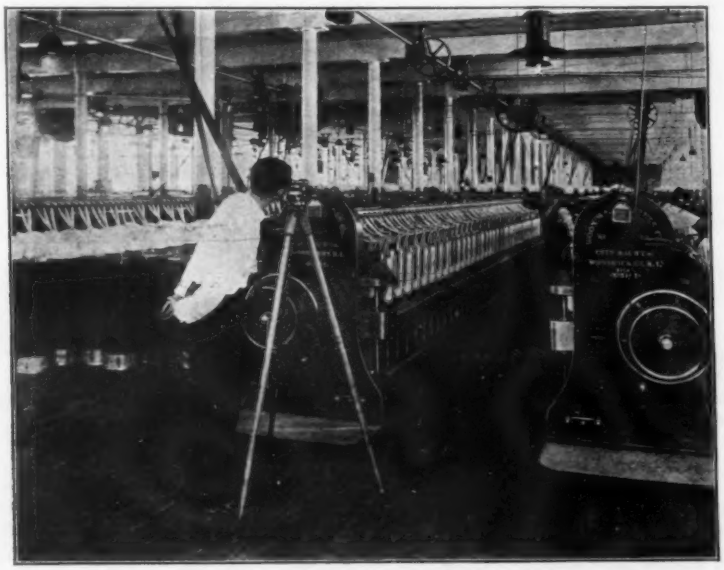

FIG. 9.

ning time. Never more than three men worked on the job, and most evenings but two. The charts shown on Fig. 8 were taken by the chief engineer of the factory. The top chart shows the power consumption before the work of aligning was done. It will be noted that the total load was 307 h. p., of which 113 h. p. was charged to friction, showing a friction load of 36.8 per cent., 1.8 per cent. above what was considered normal. Within five hours after the work was completed, a second reading was taken to determine the saving, if any, and at this time the friction load showed 93 h. p., which was 25.5 per cent. of the total load, a saving on the 2,510 feet of shafting of 20 h. p. Since this chart was taken in this particular case, a further saving has been shown. It was admitted that the saving in power would amount to about $1,100 a year. Needless to say, since that date they have used only the scientific method of aligning their shafting. Another point is clearly illustrated in these charts, namely, the more even run due to the removing of the friction. The vibration on the shafting is clearly shown in the first chart and the speeding up of the shafts, and the much more even run is noted on the second chart.

A large corporation, controlling over 20 large mills, surveys and adjusts all their shafting monthly, and states that it is a paying proposition for them. Their chief engineer states that their tests show not only reduced friction, but improved quality of output. All shafting should be adjusted at least three times a year.

LEVELING-UP MACHINES

Before stating our conclusions, we would like to call your attention to the fact that this outfit, while it was built primarily and distinctly for shafting work, is nevertheless adaptable to many different purposes in a textile plant; the grading of water pipes, the setting of machines, the securing of lines and levels, the leveling of mules and their runs, spinning frames, roving frames, shafting lathes, etc.

In this connection we insert Fig. 9, showing a reading on a roving frame in the city of New Bedford, the result of which was the overhauling of this particular frame.

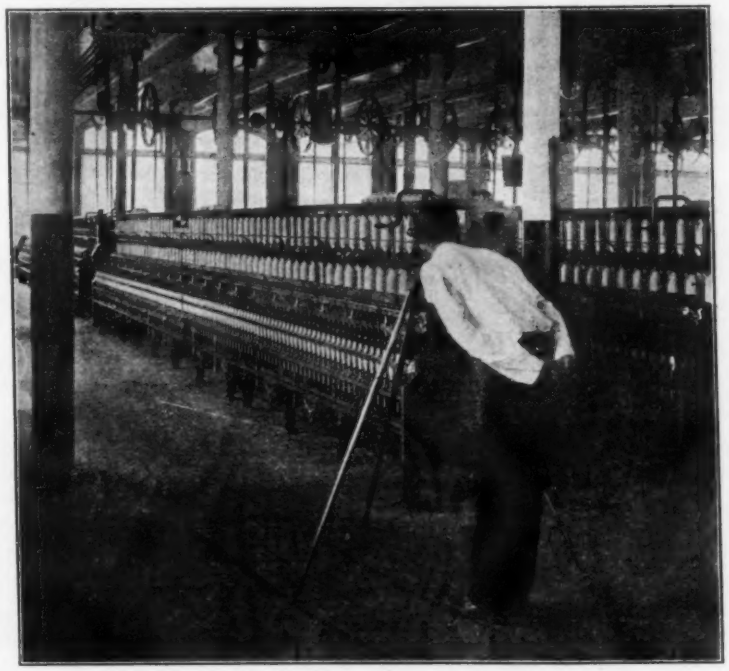

FIG. 10.

Fig. 10 shows a reading being taken of the settlement of a Whitin spinning frame.

Fig. 11 shows the leveling of the runs of a pair of mules. The mules themselves were subsequently leveled in the same way.

In conclusion we have the following observations:

1. No manufacturing plant receives the full benefit of its power either in driving capacity or finished product, without an up-to-date comprehensive and scientific system of shop surveying. Several plants in this country have already developed such a system with very material and satisfactory results.

2. The scientific method of shop surveying enables us to definitely locate and correct error.

3. It enables us to survey any shaft without re-

moving obstructions and without removing belts. A word on this last point: It is a common policy that belts should be removed when shafting is aligned. It has been clearly proven that this is an error; that all shafts should be aligned and leveled with the belts in place. The reason for this is that a tight belt would very naturally pull a shafting over, and the removing of that belt causes a natural rebound in the shaft. Were the shaft aligned with the belts removed the alignment would immediately be thrown out by the putting on of the belts, whereas if the shafting was surveyed with all belts on, an adjustment would be secured as near as was possible to secure it, to the running line.

4. It enables us to align our shafting without shutdowns, night or day, pitch dark or broad daylight, and the operation is so rapid that a noon hour or a couple of extra hours in the evening is all that is necessary to readjust any ordinary shaft.

5. It enables us if necessary to align the shafting running. The writer knows of no other system by means of which a running shaft can be surveyed and adjusted, and while he has already stated he does not believe that shafting should be aligned while running, many times it is imperative that this be done.

6. The scientific and accurate adjustment of the shafting reduces vibration. It was the writer's intention to enlarge on this phase of the question, for it is a serious one, but time will not permit. He simply makes this statement: that friction on shafting causes irregular running which in turn causes vibration to the belt, and this vibration is carried right to the machine itself. The reducing of the friction from the shaft results in the more even run and the elimination or at least material reduction of the vibration from the belt; and the cancellation in many cases of all vibration on the frame of the spinner or weaver affecting the quality and quantity of the output. This is too large a subject to go into at this time, and we simply drop this observation for your consideration and thought.

7. Shafting should be surveyed and adjusted frequently, never less often than twice a year, and results dictate a more frequent lining up.

8. The system insures the positive reduction of friction and the positive saving of power. We have illustrated by a chart a mill where 20 h. p. was taken from 2,510 feet of shafting. We might speak of a textile plant in South Carolina where 50 h. p. was saved on 3,000 feet of shafting and of another plant in North Carolina where the saving was exactly 1 h. p. to every 100 feet of shafting in the plant. If I were asked to state in concrete, simple terms what the saving should be in other plants, what the difference in friction is between a scientific accurate surveying of shafting and the method ordinarily used, I should say it is at least 1 h. p. to every hundred feet of shafting.

FIG. 11.

The day is coming—if it has not already arrived—and it has arrived to a good many, when this question of friction and vibration is to receive a great deal more thought and attention than it has heretofore, for we are beginning to realize the tremendous waste due to friction on shafting and machines, which friction can be very largely removed. We trust that this paper will encourage some to investigate carefully this question, and that such investigation shall lead to the improvement of the condition of many plants.

Correspondence and Notes

UPON TEXTILE TOPICS AT HOME AND ABROAD

REMOVING SPOTS AND STAINS FROM TEXTILES

BY ROBERT DANTZER

Translated from the French by the Editor of the Textile World Record.

The removal of spots and stains from textile fabrics depends upon the chemical properties of the material causing the spot and of that used for dissolving it. For this reason it is necessary before beginning to remove spots and stains to determine the nature of the textile fabric and of the material causing the spot. Generally speaking, the longer a fabric has been stained the more difficult it is to remove the spot and it is, therefore, advisable to proceed with the work of cleaning the stained goods as soon after the formation of the spot as possible. In many mills manufacturing fancy goods the removal of stains is entrusted to a specially trained operative. It is evident that the removal of spots from woven cloth, knit goods or tulle depends on the same principles, the construction of the fabric not affecting the process in any way. For convenience we will consider this subject under two heads: 1. The material used for cleansing the goods; 2, the nature of the spots and methods employed for removing them. We will confine ourselves to indicating the methods and processes in general use, although there are a large number of formulas more or less meritorious, which are treated as secrets by the possessors, who place what is probably an exaggerated value upon them.

MATERIALS EMPLOYED FOR REMOVING STAINS

Water. It is seldom that water alone, either hot or cold, is sufficient to remove spots on textile goods. It is nearly always necessary to add some material to it. At times the goods are steamed in order to soften the substance causing the spot and enable it to be more easily dissolved.

Acids. A number of acids are used, some being mineral and others organic acids. For example, sulphuric acid is used to brighten and restore certain colors which have been more or less dulled. Acetic or citric acid is sometimes used in place of sulphuric. Citric acid is very useful in removing rose colored spots from scarlet goods. Hydrochloric acid removes ink and rust spots on white goods. Oxalic acid removes spots caused by ink, rust and fruit or astringent juices, etc. Sulphuric acid removes spots caused by certain fruit juices on wool fabrics or white silk. It is better to use the acid in the liquid rather than in the gaseous state.

Alcohol. This liquid plays an important part in removing the spots either alone or mixed with other substances, such as the essential oils.

Alkali. Solutions of soda and potash are frequently used, the carbonates of this alkali being usually employed.

Ammonia. This agent is more energetic than is usually desirable for the removal of spots from fabrics.

Refined benzine. This dissolves completely the fatty materials, grease, oil, tallow, etc. It also dissolves rubber, resins, tar, mastics and paints. As it possesses the property of not returning to the resinous state it leaves no trace on the fabric.

Ceruse. This material possesses the property of removing spots of grease and oil from pure wool fabrics and white satin.

Chalk. This possesses the same properties as ceruse, Briancon chalk giving the same results.

Cream of tartar (bi-tartrate of potash). This material is used to remove spots caused by mixtures in which are particles of oxide of iron, such as mud, cart grease, etc., and which resist the action of turpentine.

Eau de Javel. This is a solution of chloride or hypochlorite of potash. It is used only on undyed hemp, linen or cotton fabrics to remove fruit stains.

Essence of refined volatile oils. This includes essence of lemon, lavender, bergamot,

turpentine, etc. They are used for removing spots caused by grease, resin, paint and similar materials.

Essence of petroleum. This is used in place of turpentine.

Sulphuric ether. This likewise is used to dissolve spots caused by oil and grease.

Beef gall. This dissolves fats and is used on materials that would be affected by alkalies and soaps, principally wool wool fabrics. It should be avoided when treating delicate shades.

Egg yolk. This possesses about the same properties as beef gall and like the latter should be employed only when fresh. Its action is increased by adding a small quantity of turpentine. It should be used slightly warm.

Luzerne root. Boil in water for 1/2 hour, the decoction being used for cleaning linen, wool and silk fabrics.

Panama bark. This is the bark of the quillaja, the decoction being used advantageously for cleaning fine wool goods.

Soap wort. The decoction made from the leaves and roots of this plant is excellent for cleaning wool goods.

Soap. In ordinary use white Marseilles soap serves very well for fine fabrics. The green soap made with potash is dissolved in gum arabic, the mixture being used for cleaning fine silks. A mixture of soap and alcohol containing a small quantity of some essential oil is used, being known under the name of soap essence.

Bicarbonate of potash. This dissolves fatty substances readily, but should be used only on fast colors.

Bioxalate of potash. This has the property of dissolving metallic oxides.

Carbon bisulphide. This is an excellent solvent for grease, resins, rubber and gutta percha.

Powdered earths. Various minerals when pulverized are useful for removing grease and oil spots, which they absorb readily. Under this head are included fuller's earth, pipe and other clays, gypsum, magnesia, ashes and Brianson chalk. Care must be taken in using them on material best suited to the goods under treatment.

Flour. White flour is used for the dry cleaning of carpets.

Chloroform. This solvent is used in place of benzine for delicate fabrics.

Vaseline. This material is used for softening paint spots previous to removing them with benzine or chloroform.

Fats. Rancid butter and lard are used on certain kinds of spots to facilitate their removal.

(To be continued.)

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A HAND BOOK OF WEAVES

By G. H. OELSNER, Director of the Weaving School at Werdau.

(Translated and Revised by Samuel S. Dale.)

(This series of articles began in July, 1911.)

BASKET WEAVES

A basket is a plain weave in which two or more adjacent warp and filling threads are raised and lowered together as if they were a single thread. This produces a checker board effect, the size of the squares depending on the number of threads worked together.

The warp threads working together side by side can be drawn on separate shafts or on the same shaft. It is sometimes found necessary to draw into one heddle the threads that work together side by side, owing to the character of the yarn. It is also necessary at times to use a binding thread woven with a plain weave at each side of the cloth to prevent the filling from being drawn in when weaving.

Fig. 187 shows a 4-thread basket weave. A plain weave for the selvage is shown at the left. A plain shaft for an outside binding thread is shown at the right of the draft; the latter is used when the body of the selvage is woven with the basket weave used in the body of the cloth.

Fig. 188 is a basket weave in which three threads in warp and filling are woven together.

Fig. 189 is a basket weave in which four threads in warp and filling are woven together. Fig. 187 is called a 4-leaf; Fig. 188, a 6-leaf; Fig. 189, an 8-leaf basket.

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If the warp is set closer than the filling, a weave having more warp than filling threads warp threads and two filling threads woven together. Squares of different sizes can be

FIG. 187.

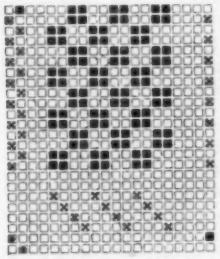


FIG. 188

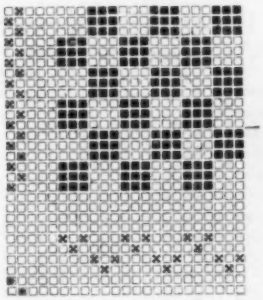
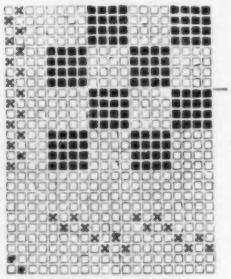


FIG 189.



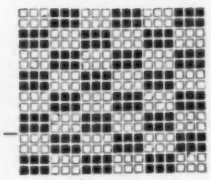


FIG 190.

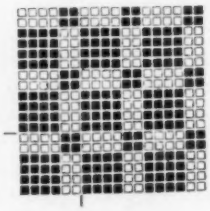


FIG. 191

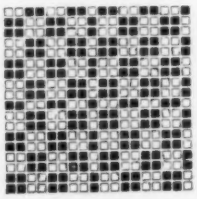


FIG. 192.

FIG. 193.

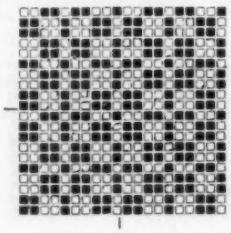


FIG. 194.

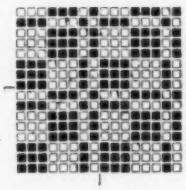
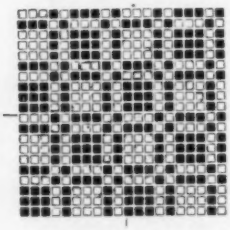


FIG. 195



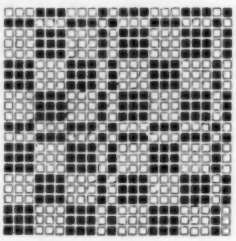


FIG. 196

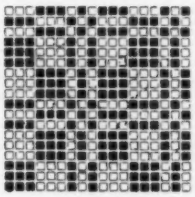


FIG. 197.

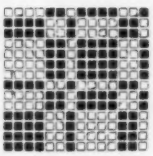


FIG. 198.

working together is used in order to prevent the squares from becoming oblong. Fig. 190 shows such a weave having three

woven in the same pattern, as shown at Fig. 191, in which four threads working together alternate with two threads.

Pleasing effects can be produced by inserting single threads between the threads working together to form the basket, especially when the color of the single threads contrasts with the ground. Figs. 192, to 198 show various weaves of this kind.

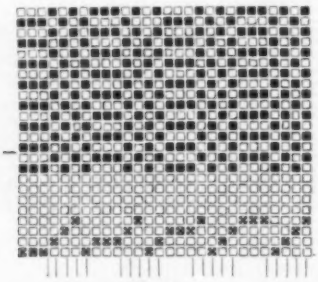


FIG. 199.

(A) LONG RIBS

A rib weave is a modification of the plain weave. The simplest rib weave is made by weaving two, three or more threads together as one end next to several warp threads which are woven with a plain weave. The former, lying side by side and interlacing the filling like a single thread, rise above the surface of the adjoining threads that are woven plain, forming a ridge or rib, running lengthways of the cloth, and called a long rib.

Fig. 199 shows a pattern in which four warp threads woven plain alternate with three threads woven together as one end.

Generally the combined threads are drawn through the same dent in the reed, and can be drawn through the same heddle, if desired. If the combined threads are drawn through more than one dent in the reed, separate heddles must be used for the threads in each dent, otherwise the twisting of the threads in the heddle will result in their being broken by the reed. Fig. 200 shows four threads woven as one, alternating with two threads in a plain weave.

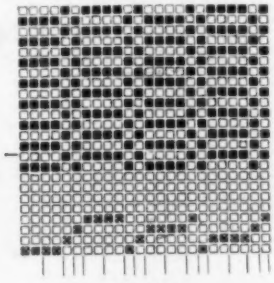


FIG. 200.

Figs. 201 to 205 show weaves used for long ribs in fine worsted goods, in which, however, a very close set is required in the filling.

FIG. 203.

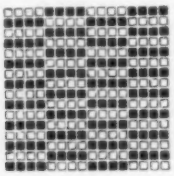
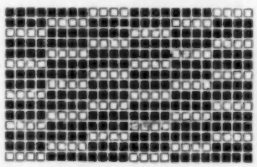


FIG. 205.



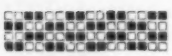


FIG. 201.

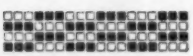


FIG. 202.

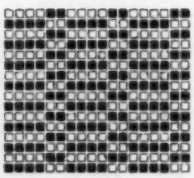


FIG. 204.

These are really plain weaves in which several warp threads are woven as one thread.

In the regular long rib weaves such as are shown at Figs. 201, 202 and 203, the warp is

almost completely covered by the filling, hence the term, "filling rib," applied to long rib weaves.

(B) CROSS RIBS

A second form of rib weave is found in the cross rib, which can be made by alternating a thread carried by the shuttle at each pick, inserting the desired number of picks in the same shed.

Fig. 206 shows two picks woven in every third shed; in Fig. 207 three picks are woven in every other shed.

FIG 206.

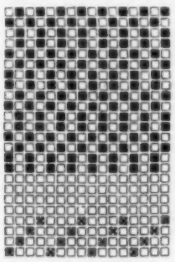


FIG. 207.

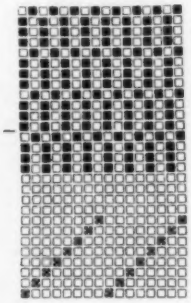
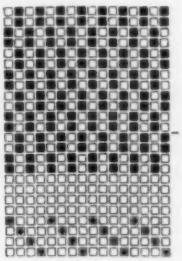


FIG 208.



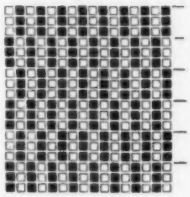


FIG. 209.

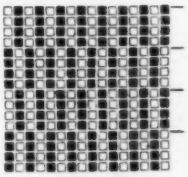


FIG. 210.

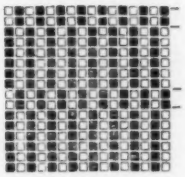


FIG. 211.

coarse filling thread with several fine threads in a plain weave.

In place of the coarse pick two or more single threads can be wound on a bobbin and woven as one. More or less twist is imparted to the threads in this way, however, and this gives an irregular appearance to the cloth. For this reason when a very smooth face is desired it is best to have but one

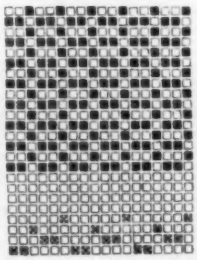


FIG. 212.

A catch thread in the selvage is necessary with these weaves. The yarn forming the rib

FIG. 214.

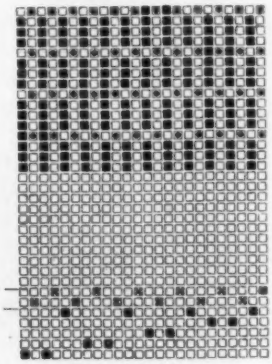


FIG. 213.

is sometimes made from cheaper material in order to reduce the cost of the goods.

separation between the ribs are indicated by the lines at the side of draft.

FIG. 216.

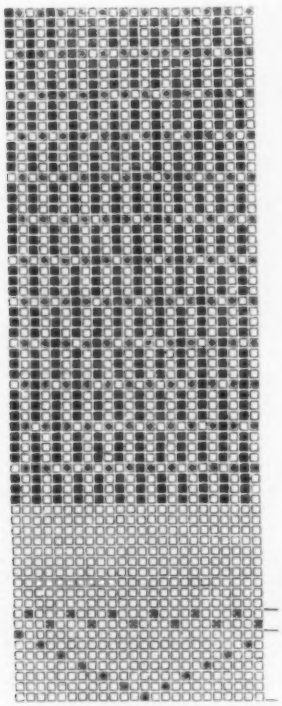


FIG. 215.

FIG. 218.

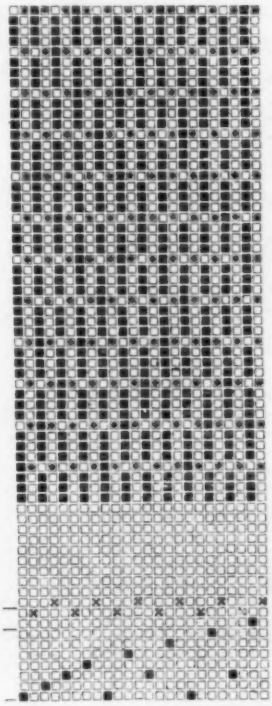


FIG. 219.

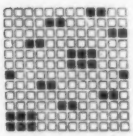
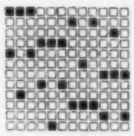
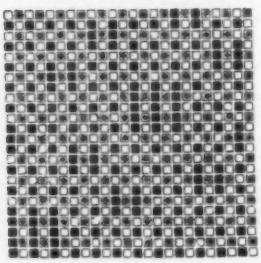


FIG. 217.

FIG. 221.





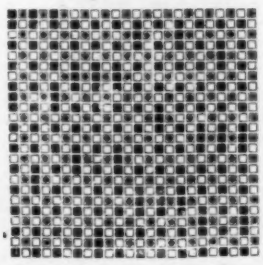


FIG. 220.

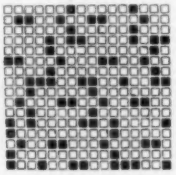
FIG. 222.

Cross ribs are also made with weaves like Figs. 208 to 211, in which two, three, four or six picks are woven in a shed. The lines of

In the regular cross rib weaves, as shown at Figs. 208 to 211, the filling is almost completely covered by the warp, for which reason

cross rib weaves are sometimes called warp ribs.

FIG. 223.



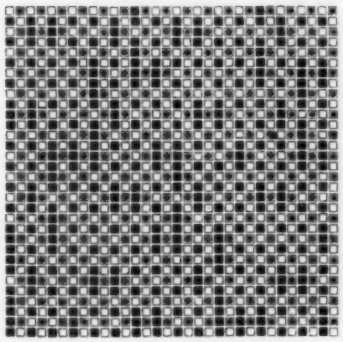


FIG. 224.

The third class of rib weaves is the full rib for which fine and coarse yarn is used in both warp and filling. Goods woven with these weaves are used chiefly for upholstery, vestings, etc., and are frequently made of silk and wool or silk and cotton; they are generally woven with 2 warp threads working together alternating with a single thread. For a woolen and cotton fabric two threads of woolen twist working together alternate with

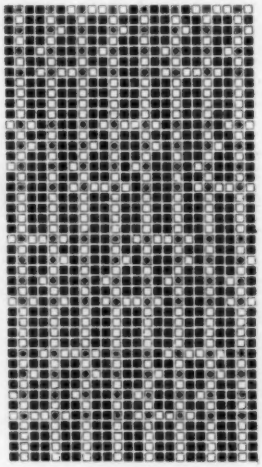
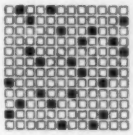


FIG. 225.

FIG. 227.



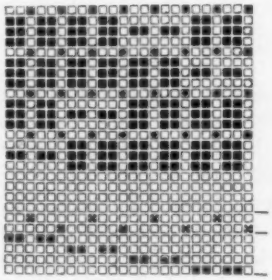


FIG. 226.

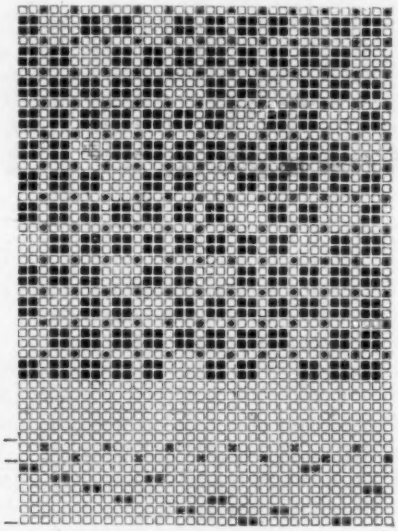


FIG. 228.

one thread of fine cotton twist. Two shafts only are required, but where the set is from 60 to 90 threads per inch four shafts are used. The woolen and silk warp should, if possible, be drawn on the front harness to give a clear shed. When the woolen warp threads are raised, a coarse cotton pick is inserted; the latter is thus covered by the woolen warp and is visible only on the back of the cloth.

To make the rib more prominent, the fine division warp thread should be woven tight, and the coarse rib warp woven slack, the latter being weighted so that it will yield slightly when the lay beats in the coarse filling. On plain looms without the drop box these full ribs can be made by weaving two or more picks in a shed in place of the coarse rib pick, using but one kind of yarn in the filling. A weave for this method is shown at Fig. 207.

FIG. 229.

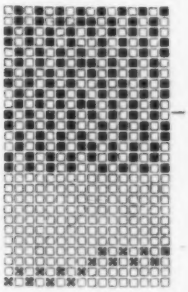


FIG. 230.

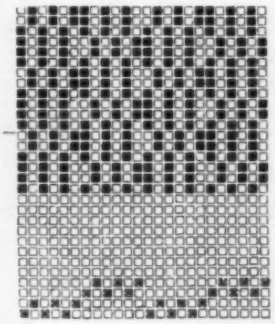


FIG. 231.

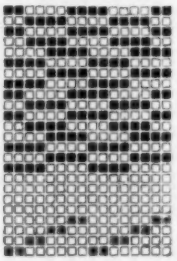


FIG. 232.

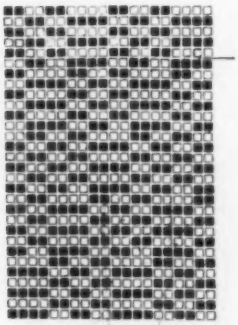


FIG. 233.

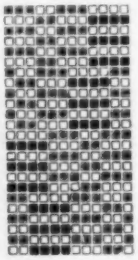
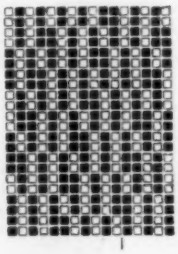


FIG. 236.



When the cotton warp is raised a single cotton pick of the same kind of yarn is inserted. The fine filling is woven when the woolen warp is down, but is not prominent on the face owing to its fineness.

In silk ribs the rib pick is also a coarse cotton thread, the other pick being a fine silk thread. The coarse cotton filling, which is hidden by the close set warp, gives the cloth a better feel and reduces the cost.

The coarse rib warp threads and fine warp must be woven from separate beams, as the former "take up" more rapidly in weaving.

(C) FIGURED RIBS

Figured effects are easily obtained on rib weaves by raising warp threads above the filling tie thread at certain places. This converts two warp floats into one, the warp thread being raised successively over a set of rib picks, a division pick and a second set of rib picks, as in threads 1 and 3, Fig. 214. In drafting figured ribs it is necessary first to select a motif for the design, which is then transferred to the weave draft. Figs. 213 to

225 are examples of figured ribs and motifs.

Fig. 213 motif for 214
Fig. 215 motif for 216
Fig. 217 motif for 218
Fig. 219 motif for 220
Fig. 221 motif for 222
Fig. 223 motif for 224

In Figs. 220, 222 and 224 each set of rib warp threads drawn on one heddle, are represented as one thread, as is customary for this class of goods.

Another method of forming fancy ribs is to lower two or more adjacent rib warp threads to the back of the cloth under certain picks, each of which is thus brought to the face. This method is shown at Figs. 226 and 228. Fig. 213 is the motif for Fig. 226; Fig. 227, the motif for Fig. 228.

IRREGULAR RIBS

These are formed by offsetting the rib line at intervals. At the changing point the float forming the rib is raised slightly above the float of the preceding thread, and the rib is then continued on the new line until the pattern requires a change.

In Fig. 229 the rib is offset for one pick at the 1st and 9th warp threads. Each group with a regular rib includes eight warp threads.

In Fig. 230 the rib is offset four times, the change being for three picks each time. Each group with a regular rib includes six threads.

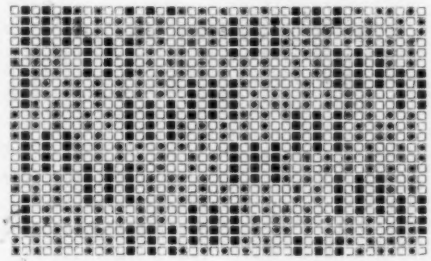
Fig. 231 is a filling rib offset two threads every four picks.

Fig. 232 shows a $^{2}\!-\!_{2}$ filling rib with groups of four threads each arranged in 5-leaf satin order. Pleasing effects are obtained by combining floats of different lengths in irregular ribs.

Fig. 233 shows the weave $^{4}\!-\!_{3}\!-\!^{2}\!-\!_{3}$, in the filling; Fig. 234 the same order in the warp.

Fig. 237 shows a fancy rib weave in which

FIG. 234.



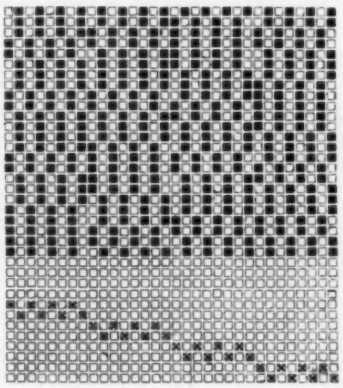


FIG. 235.

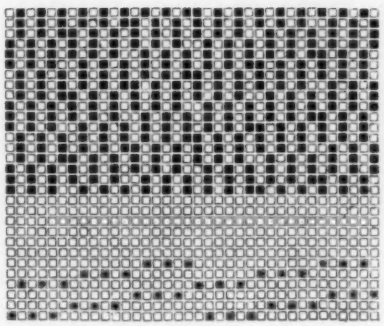


FIG. 237.

the rib float is raised one pick at intervals of six warp threads; the pattern covers thirty-six warp and six filling threads.

Fig. 235 shows a $\frac{5}{}$—$\frac{}{5}$ rib weave offset in 4-leaf broken twill order.

(To be continued.)

AMERICAN AND AUSTRALIAN WOOLS

Editor Textile World Record:

I notice in your September number of the Textile World Record an article written by Col. W. L. Black, Fort McKavett, Texas. Col. Black makes the following statement: "My personal experience in raising wool has extended over a period of 35 years, and I can testify to the fact that it has been a very unprofitable undertaking. I venture to say the growers in Australia, New Zealand, etc., have received 50 per cent. more profit from their industry than we have, while under the law of supply and demand we should receive the selling value of their product, plus the duty of our tariff. What is the cause of this, and can we not apply some remedy that will remove the trouble?"

In answer to this statement I would say "yes," a remedy can be applied. Col. Black as a wool grower for so many years surely has noticed the condition and "get up" of Australian wools and New Zealand wools. While I don't question the ability of our farmers raising wools to compete with these wools, I contend they will never do it as long as they remain indifferent to the breeding and care of the sheep, and the putting up of the wool for the market. Col. Black should know that the wool raisers of Australia vie with each other in their brands, the breeding of sheep and the putting up of the wool. Did Col. Black ever see Australian or New Zealand wool fleeces tied with clothes' lines or sweepings of the barnyard with dung locks put into the center of the fleece? On the other hand, these wools are neatly put up in compressed bales—fleeces in many cases only folded, and in other cases tied with paper twine, so light that it weighs almost nothing.

This country has a variety of climates, but wools can be greatly improved if our wool raisers give proper attention to the breeding of the sheep, and handling of the wool. There are many raisers of wools in this country who do not have the slightest idea of how Australian wools are put up, and many of them would not believe you if they were told the condition.

Let our wool raisers start right and the solution will be apparent.

J. D. Blackwood.

ENGLISH NOTES

By Our Special Correspondent

Bradford, Eng., Sept. 18, 1911.

The rise in the cost of living which has given tariff troubles to America has given England violent strikes, principally of transport workers. Measured by an official index of London retail food prices the advance since the low-price year 1895 has been 17.9 per cent., with which general wages have not kept step. Textile operatives have been better compensated than some others and if one chooses to go so far into history, it can be shown that wholesale food prices are 23 per cent. lower than thirty years ago and textile wages 19.4 per cent. better. None the less there is grumbling about the low purchasing power of the sovereign.

The books of Rylands & Sons, the largest textile jobbers in this country, have been examined with a view to finding what the rise has been in textile materials and goods. The prices are summarized in the tables:

	1901	1911
Jute per ton	$67.20	$115.20
Flax per ton (1902)	91.20	144.80
Cotton per pound	.09½	.17
Serge per yard	.12	.16
Alpaca per yard	.20	.24
Cashmere per yard	.17½	.21

In the absence of anything to the contrary it is assumed that the serge, alpaca and cashmere are ordinary Bradford goods; the serge, a worsted dress fabric; and the other fabrics, cotton warp goods. In certain cases the advance dates from 1896, as in the following:

	1896	1911
Linen per yard	$0.05½	$0.09
Flannelette per yard	.03½	.05½
Blankets per pair	1.02-2.82	1.18-3.12
Carpets	advance 10 to 20%	

Sewing cottons began their advance in 1894:

	1894	1911
Sewing cotton (144 reels)	$6.66	$8.10
Sewing cotton per reel	.05	.06
Knitting cotton per 10 pounds	4.04	5.04
Rylands' Daced per 3 pounds	1.72	2.58

In a similar space of time rates (local taxes) have been rising and in Scotland the increase since 1894 works out to 66 1/2 per cent. National expenditure unceasingly increases and with the exception, here and there, of profits it may be said that nothing has come down.

* * *

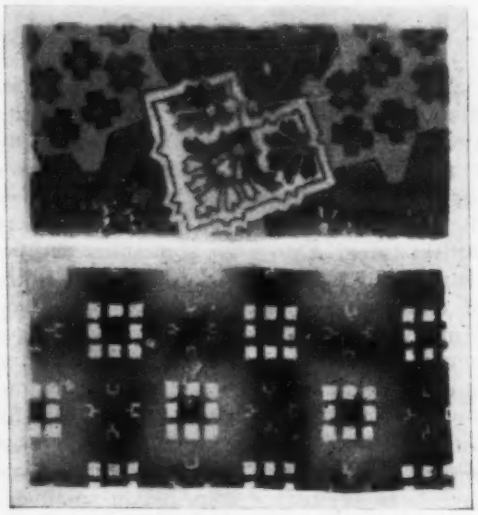
Although it came in like a lion, the British Patents Act of 1907, imposing compulsory working on foreign patentees, has long ceased to arouse any more attention than a lamb. A dozen or two factories were opened by foreign firms and a certain number of licenses to manufacture were sold to Englishmen, but nothing is heard of any more works erected to save the lives of foreign-held patents. The observations of a chemical manufacturer on the subject may be of interest:

> They (the United Indigo & Chemical Company) had entertained considerable hopes that the Act would be of great benefit to them, but they had not derived the slightest benefit from it. It was a good Act, but it had never carried out the intention with which it was brought forward, because there were no inspectors to see that a patent specification was really worked out in a works ostensibly put down for working it out in this country.

The British Act, like the German one, prescribes "working to an adequate extent" and one American sewing machine patent was revoked because the extent was not adequate in the opinion of the Comptroller. Naturally the holders of patents keep their own counsel as to what they do in their own works and the onus of discovery is not on the Government, but on the plaintiff in any particular case. Without a radically different Act there can be no inspection.

* * *

A biologist and director of horticultural science has been exposing the bareness of the scientific larder in knowledge useful to the textile world. Mr. Bateson was asked by an Australian breeder whether it is scientifically possible to combine the utmost length of merino wool with the utmost fineness and the right degree of crimping. He had the humiliation of replying that the physiological factors determining the length or fineness of wool are matters about which scientists know absolutely nothing with certainty. In the case of flax the question has arisen: How to breed a strain combining the maximum length with the maximum fineness of fiber. The director of the John Innes Horticultural Institution can only hold out the hope that the problem by good chance and prolonged study may be solved some day. There is the encouraging example of



PRINTED DESIGNS ON FABRICS.

H. M. Leake in India who has employed scientific means to produce by intermarriage a fine quality of cotton on an early-flowering variety suitable for growth in the United Provinces. The scientist confesses himself abashed by the sight of what breeders of live-stock have done without scientific aid, but he has taken the right direction. The way to end ignorance is to advertise it.

* * *

A Manchester man has devised a method for showing off print designs on fabrics without incurring the preliminary expense of rollers. Most of the printers doing large work, on cretonnes for example, are using

this special form of stencil for samples. The Japanese long ago hit on the expedient of supporting isolated parts of a design by attaching hairs to hold them in position. In the "Nomis" stencil there is a foundation of gauze and the solid is formed of some composition impervious to the fluid colors. The colors are sprayed upon the fabric through the interstices of the gauze and when done on cotton the obstructive effect of the gauze is lost. The samples sent to the Boston office of the Textile World Record are proof that all sorts of designs can be negotiated, but the particular utility of the process is for large effects. These patterns can be seen at our Boston office, two of them being shown in the accompanying illustrations.

* * *

The curtain trade has been undergoing marked progressive changes. The introduction of the short, plain-cloth casement curtain did violence to lace and set up a demand for cream luster wool and cotton warp casement cloths for which certain Bradford houses cater. Desire for something cheaper than wool introduced cotton casement cloths of a canvas-like texture which have incidentally come in useful for summer costumes. From cream the trade progressed to dyed tints and now the plain cloth is giving way to fabrics figured in artificial silk and is tending towards deeper colors. Most of these have been sold plain, although some have been printed or stenciled in small designs set wide apart. Now printed curtains are coming into favor in quarters which set the fashion. They are on light art-muslin, printed in relatively heavy masses of three or four art shades with a border and scroll. These printed muslins are also serving a second purpose. When cut up they make admirable scarfs for trimming sun hats or garden hats for ladies, and they are of course cheap. It must be the case that the fashion for what are substantially opaque curtains is affecting the business in window-blind fabrics.

* * *

The financial history of Isaac Holden & Sons, Ltd., the Bradford combers, will serve as an example of the most cautious and conservative mill finance. Little more than eleven years ago the business was transferred to a public company, since which time 5 per cent. has been paid regularly on a preference capital of about one million dollars and an average 4 3/4 per cent. on an equal amount of common stock. The 4 per cent. debentures have been reduced from slightly more than a million to some $50,000. Concurrently the directors have been appropriating money to a depreciation fund and a reserve fund. Out of depreciation money they have built a new warehouse and equipped a long-wool combing shed, bought three new engines and six new boilers in replacement of four engines and 12 boilers and have built two new engine houses. Out of a reserve they have extinguished the debentures, and both funds have balances to credit after the element of good will in the capitalization has been wiped out. This record is too good to be quoted as typical of English methods, but may serve to show the style of management which wins applause from the stockholders in this country. The business stands as high as ever in the esteem of the trade and it is stronger and more compact financially after 11 years of wear and tear.

* * *

From some records of tests made at the Bradford Technical College it appears that there is little to choose in point of strength between viscose silk, made from wood pulp by the zinc process, and Chardonnet silk made by dissolving gun-cotton. A viscose thread 240 deniers 2 fold broke at 12.17 ounces and a similar Chardonnet thread at 12.7, but where the first stretched 1.42 inches the second stretched .83 inches. The marked difference is one of elasticity. Water has an almost identical effect on the strength of both, reducing the breaking strains to 4.22 and 4.09 ounces respectively, and in both cases increasing the elongation of the yarns when under test. Of two woven patterns boiled in water for 30 minutes and allowed to dry naturally, the viscose-filled fabric shrunk 4 per cent. and the Chardonnet 8 1/2 per cent. There have been lawsuits in this country arising from the omission to allow more take-up for nitrated than for vis-

cose artificial silk. In the market, among uninstructed manufacturing men, one hears all manner of beliefs about artificial silks, including a superstitious one that silk formed by dissolving a fiber must of necessity be better than one manufactured from wood. It is safe to say that for weaving purposes in England viscose or pulp silk has many more adherents than any other.

* * *

The perfect wool bag is still undiscovered. Men thought they had found it in the jute bag with the paper lining, but in the compression Australian bales receive before shipment the paper disintegrates and in some instances has been a worse nuisance than stray jute fibers. The calico-lined bag failed, the stockinette wool-lined bag also failed because the lining fell into the bottom in course of packing. The dyed bag, colored so that the vegetable matter is made visible, has been condemned because the color bleeds. The jute bag with a boiled-oil dressing is in disgrace because on arrival in Australia the bags were welded together in a solid mass which had to be broken into its component parts with crowbars. The defects may not be irremediable, but they are more than the trade will stand and the trade wants its bags at a price. The new star on the horizon is the marine fiber dredged off the Australian coast, a material which has the merit of taking the same dye as wool, albeit not necessarily to the same shade. The problem is still unsolved and good bags warranted not to break or fray are still wanted—fervently by makers of worsted cloth, but also wanted by the most enlightened growers of wool.

* * *

The practice of spinners in the matter of charging weight varies perceptibly from mill to mill. Not many, but a few in the worsted trade, systematically give a fractional overweight and expect to get recognition of it in the shape of further orders. Apart from the perhaps more numerous ones who give underweight whenever they can, are those who give no more than the barest "'bacca" weight, in other words not an iota more than will tip the beam. The same divergence is seen in the matter of maintaining qualities.

LUSTERING WOOL

BY REGENT

A demand has sprung up in England for fine worsted yarn finished with so high a luster that it may replace silk in making fancy twists for men's goods. The demand draws attention to the little that has been done to improve the natural luster of wool by any other than physical means. Yarn is gassed, but the effect of that operation is not so much to enhance the original luster of the fiber as to remove the surface obstructions which interfere with the full play of the reflection of light. Cloth is pressed, or steamed and pressed. The fibers when lying in their final position are softened and flattened in order to produce a surface highly reflective of light. This process is not readily applicable to a half-manufactured article and it is far from resembling such an operation as the mercerizing of cotton.

Common experience is enough to show that little has been done on a commercial scale towards providing wool with a luster like silk. Dyers who are asked for these yarns have in some cases no idea of how to begin to obtain the result. And if there were no practical experience the state of the patent files would stamp this as a neglected subject. Except for one patent in 1910, the files for the last thirty years have nothing to show of any efforts made to change radically the lusterousness of the wool fiber. Dr. Emil Elsaesser of Langefeld, Westphalia, is apparently the first with what is called by a slight perversion of terms a process for mercerizing wool. There are excuses for annexing this name, for Elsaesser employs a chemical which exerts a shrinking influence on wool, just as Mercer employed one which shrinks cotton. In both processes the shrinking is prevented and to this is due the new luster. The chemical is bisulphite of soda which has been used to produce crimp effects in wool farbics and along with chrome has been used as a mordant enabling wool to be deeply dyed.

The claim is that bisulphite of soda enables a high luster to be obtained without loss of strength. The yarn is maintained under tension at rather more than its natural

length and treated in the soda solution at a high temperature until a rubber-like elasticity begins to show. Five minutes in a bath containing 1 part of sodium bisulphite 40° B., diluted with 5 to 6 parts of water is specified. The yarn is removed into water containing 2 per cent. of mineral acid, boiled with relaxing tension for one hour and then rinsed and dried. The patent may be important if the claim that luster is obtained without detriment to strength can be substantiated in regular practice. The chemical used is neither so expensive nor unpleasant as some others which have been recommended for the purpose, and it may be less injurious to the handle of wool.

Chlorine, although it turns wool yellow, attacks the sulphur contained in the fiber, and gives a harsh feeling, can be used to improve the natural luster. One method of using chlorine which has been named involves the use of a lead chamber in which the yarn is to be hung for half or three-quarters of an hour in an atmosphere of chlorine gas. The gas itself is deadly and obnoxious and a solution of it is to be preferred. Bowman has recommended chlorination in the presence of such salts as acetate of iron, aluminate of soda, etc., followed by washing in very dilute alkali and exposure to air. This is with a view to avoiding over-harshness. A solution of bleaching powder along with carbonate of soda has been named with the same end in view.

Bromine, like chlorine, has a strong affinity for hydrogen, attacks sulphur and is irritating and unpleasant in use. It also has been recommended in a strength of 7 parts bromine to 100 of water at 70° to 80° F. The yarn is treated in this for half an hour, washed and then dried. Dr. Bowman has noted that wool treated with caustic soda in the presence of glycerol absorbs a considerable amount of soda to the accompaniment of a marked rise in temperature. Wool so treated is improved in luster and in its power of absorbing dyestuff, but is weakened in strength by the loss of 85 per cent. or so of native sulphur.

Now that a commercial inquiry has begun and that there is a marked opening for chemically or artificially lustered wool, much more attention may be expected to this department. The notion of dealing with yarn may be succeeded by one of treating pieces otherwise than by pressure and heat.

DIFFERENTIAL MOTIONS

By B. M. PARKER, Assistant Professor on Textiles, West Raleigh, N. C.

The correct winding of the roving on the bobbin of a fly frame is the most complicated operation the machine has to perform and calls for most of the mechanism on the frame. The modern frames are all built on the bobbin lead principle, the bobbin at all times running faster than the spindle and pulling the roving through the flyer onto itself. As the bobbin builds and increases in diameter its speed is decreased automatically by the shifting of the cone-belt. This is performed by the tension gearing and the size and shape of the cones and the size of the tension gear are such as to produce the correct amount of variation in bobbin speed, thus providing for the same amount of tension on the roving from start to finish of a set.

The spindle speed is obtained direct from the main shaft and is not varied, remaining the same at all stages of the operation of the frame. The bobbin speed is variable, being highest at the start, when the bobbin is smallest in diameter and lowest at the finish of a set, when the bobbin is largest in diameter. This necessitates some means for driving the bobbins at a variable speed and for this purpose the cones and differential motion are employed.

The bobbin may be said to have two speeds. First: A constant, fixed speed, derived from the main shaft and equal to the speed of the spindles. Second: A variable speed, derived from the bottom cone and is spoken of as the "excess speed" of the bobbin. This excess speed is the one that is varied, by the movement of the cone belt, to give the variations necessary in the speed of the bobbin. The excess speed of the bobbin required depends upon the delivery

of the front roll and the diameter of the bobbin and is just enough to cause the bobbin to wind on the roving delivered by the front roll at the right tension.

The purpose of the differential motion or "compound" is to take motion from the main shaft, at a constant speed, and combine with it the motion derived from the bottom cone, at a varying speed, and deliver it to the bobbin as one speed. Now, with the bottom cone stationary, the bobbin and spindle speed will be the same and no winding is taking place, as the value of the train of gears between the bobbin and main shaft is the same as that between the spindle and main shaft. This occurs only while preparing for doffing, when the bottom cone is raised and the frame allowed to run a little, the roving collecting around the nose of the flyer. With the bottom cone in motion, winding is taking place, as this motion is transmitted to the compound and by it combined with the motion of the main shaft, giving the gear driving the bobbin a higher speed than the gear driving the spindle. This drives the bobbin faster than the spindle and causes it to wind on the roving delivered by the front roll.

The type of differential motion shown at Fig. 1 is called the bevel gear compound, and was one of the first brought out. It has been successfully used on most of the American built machine for years. On the main shaft, M, which carries the twist gear, T, and a spur gear, F, of 50 teeth driving the spindles, is a bevel gear, A, of 39 teeth. This gear is fast to the shaft and revolves with it. The gear, A, meshes into two bevels, C and D, which are idlers, carried on spokes of the sun wheel and free to revolve on their own centers. These bevels drive the bevel gear, B, called the bobbin gear or sleeve gear. This bobbin gear is loose and free to revolve independently of the main shaft, being car-

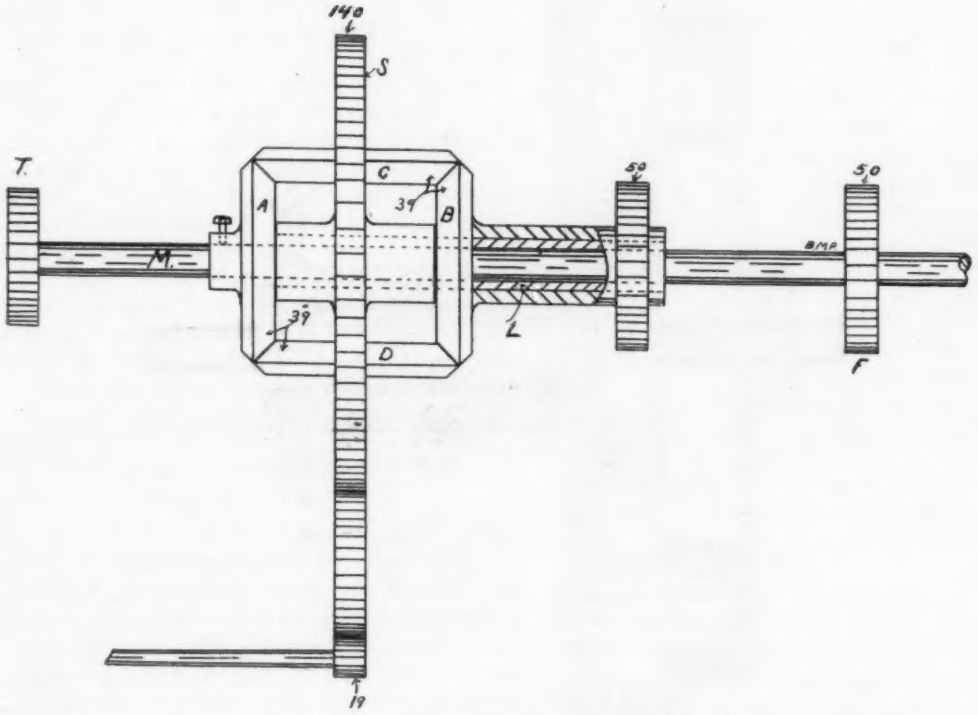


FIG. 1.

ried on the fixed collar, L. Compounded with B by a collar or sleeve, is the 50-tooth spur gear, which drives the bobbins. The sun wheel, S, of 140 teeth, is also carried on the fixed collar, L, and is free to revolve independently of the main shaft. As the friction between the gears, S and B, and the main shaft would be considerable and give rise to undue wear and trouble were they in direct contact, the collar, L, is used to furnish a bearing for the shaft and the gears separately, the shaft revolving in the collar and the gears revolving outside the collar. The sun wheel, S, is driven from the bottom cone by the small gear of 19 teeth on the end of the take-up shaft. This is called the take-up gear.

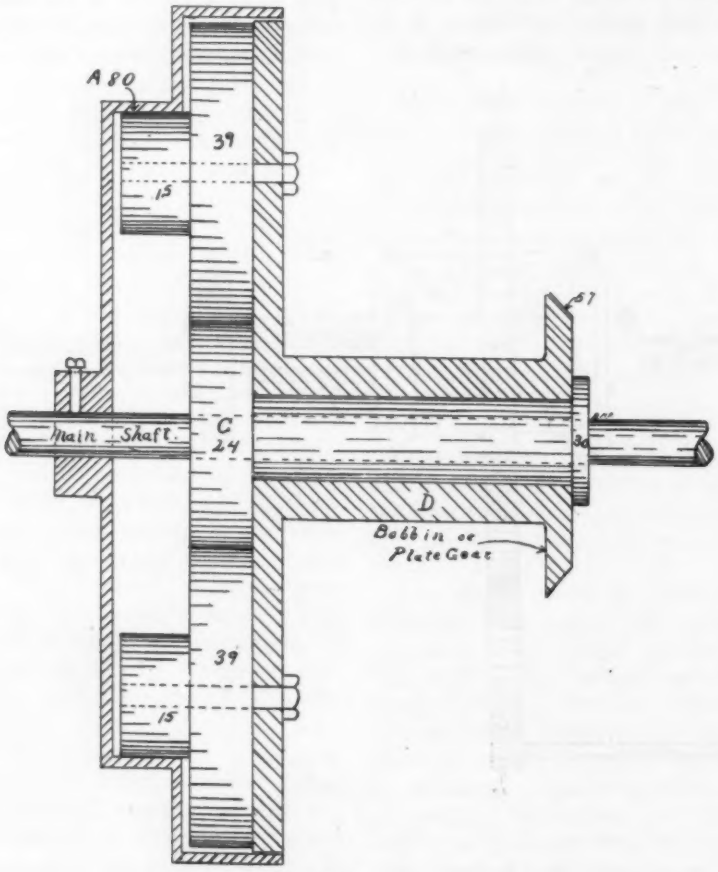


FIG. 2.

When the sun wheel revolves around the shaft, the two bevels, C and D, will revolve about the shaft with it, they being supported by the sun wheel. From the above it is clear that the final speed given to B will be a combination of the speeds of the gear A or main shaft and the sun wheel. If we take each motion and analyze it, we can see the action of the compound without trying to enter into the theory underlying its construction.

If we give A one revolution, holding S stationary, the carrier gears, C and D, will transmit this revolution direct to the gear, B, the gears, A, B, C and D, all having the same number of teeth. The direction of revolution of B will be opposite to that of A.

If we use the signs + and — to represent the direction of revolution, we get the following as a correct statement of the case:

A 1 + = B 1 —

If we consider A as being stationary and give one revolution to S, the bevel, B, will have two revolutions in the same direction as S, while S is revolving. The idler levels, C and D, are carried around the shaft with S and, as they are in contact with B, they will carry B around the shaft in the same direction and at the same speed. We can refer to this revolution of B as due to the revolution of C and D about the main shaft. As C and D are in gear with the fixed bevel, A, while S is making one revolution and carrying C and D around the shaft with it, C and D will have to roll around the face of A. This will cause C and D to have a complete revolution on their own axes. This will give one revolution to B independent of the revolution obtained above and it will be in the same direction as S. We can refer to this revolution as due to the revolving of C and D on their own centers, due to their contact with A, while being carried around the shaft by S.

This can be stated as follows:

S 1 + = B 2 +

As it is desired to revolve the sleeve gear, B, at a higher speed than the fixed bevel, A, and as the revolving of the sun wheel in the same direction as the bevel, A, would have the effect of cutting down the speed of the sleeve gear, B, it will be seen that the sun wheel must revolve in the opposite direction to the main shaft or bevel, A. Then the following formula indicates the condition:

S 1 — = B 2 —

Taking the above equations for B in terms of S and A and combining the two, we get the following formula for the compound:

A 1 + = B 1 —
S 1 — = B 2 —

(A 1 +) + (S 1 —) = B 3 —

Putting the above in words, we get the following rule for the compound:

The speed of the sleeve gear is equal to the speed of the main shaft plus twice the speed of the sun wheel.

As the bottom cone speed is automatically decreased at the end of each layer wound on the bobbin, by the shifting of the cone-belt, the sun wheel speed is decreased, thus decreasing the speed of the bobbin.

Fig. 2 shows a cut of the Daly differential motion used on the Woonsocket fine and jack fly frames, with a part of the gears cut away to show the inner arrangement. This motion employs spur gears and all parts revolve in the same direction with the main shaft. On the main shaft is an internal gear, A, of 80 teeth, driving a small gear of 15 teeth which is compounded with a 39-tooth gear, both being carried on a stud which is fixed into the plate gear, D. This plate gear also carries a bevel gear of 57 teeth that drives direct to the bobbins. The 39-tooth gear is in gear with the 24-tooth gear, C, that is on a sleeve, the other end carrying a gear of 30 teeth that is driven from the bottom cone. The 24 and 30-tooth gears are compounded together by the sleeve, the whole being called the "sleeve" gear. It revolves in the same direction as and with the main shaft, but is not attached to it. The bobbin or plate gear, D, revolves on the collar of the sleeve gear and in the direction of the main shaft.

As in the former case, there are two distinct motions that are combined into one. First: The fixed speed of the main shaft or gear, A. Second: The varying speed of the sleeve gear, C, which comes from the bottom cone and gives the excess speed to the bobbin. It is the speed that is varied to suit the conditions of winding as the bobbin increases in size. If we consider the effect of these two speeds, separately, on the gear, D, we will be able to understand the operation of the compound. While A is moving and C is held stationary, the 39-tooth gear being in contact with the 24-tooth gear, C, which is stationary, A will carry the compound gear of 15 and 39 teeth around with it and cause the 39-tooth gear to revolve around the face of the 24-tooth gear, C. This causes the 15 and 39-tooth gears to revolve

a fraction of a revolution on their own centers, which causes a lagging behind of D or a slipping ahead of A, in other words, the gear, A, will move ahead of the gear, D, by the amount that the two gears of 24 and 39 teeth move the 15-tooth gear on A. If A is moved one revolution, the gear, D, will not have a complete revolution, as the revolving of the compound gear of 15 and 39 teeth on its own axis, due to the fact that the gears of 39 and 24 teeth are in contact, causes the 15-tooth gear to work backward on the face of A and allows A to move ahead just that amount. To revolve A far enough to give D a complete revolution, the 39-tooth gear will revolve entirely around the face of the 24-tooth gear and will make 24/39 of a revolution on its own axis, consequently the 15-tooth gear, compounded with the 39-tooth gear, will make the same fraction of a revolution and work that much backward on the face of A, allowing the gear, A, to advance ahead of the gear, D, by the following fraction, representing the value of the train of gearing between C and A:

$(24 \times 15) \div (39 \times 80) = .115$

Then one revolution of D, caused by A, will call for one complete revolution of A and an additional amount, equal to the above fraction, to overcome the lagging behind of D, or A must make 1.115 revolutions to give D one revolution. Then, by proportion, one revolution of A will equal .896 revolution of D.

If we express the speed of D, due to the speed of A, in terms of A, we get the following statement:

$D = A \times .896$

The next case to consider is the speed of D due to the speed of C. Suppose A to be stationary and C to revolve one revolution, then this revolution of C will cause the compound gear of 39 and 15 teeth to revolve, which will cause the 15-tooth gear to be moved around on the face of A and give the gear, D, a part of a revolution, in the same direction as C, represented by the following fraction, which is the value of the train of gearing between A and C:

$(24 \times 15) \div (39 \times 80) = .115$

The speed of D, due to the speed of C and expressed in terms of C, will be:

$D = C \times .115$

By combining these two equations, we get the formula for the compound, as follows:

The speed of $D = (A \times .896) + (C \times .115)$. When C is not moving the gearing is so arranged that the bobbin and spindle speed are the same and no winding is taking place, but any motion given to C by the bottom cone has the effect of increasing the speed of D, thus giving the excess speed to the bobbin and causing it to wind up the roving delivered by the front roll. As the belt is moved on the cones, the bottom cone speed is decreased and the bobbins driven slower.

THE HAND WOOL COMBING INDUSTRY

BY WESSEX

The generation which knew the hand woolcombers in England is disappearing fast and of those who bore any active part in the work few remain. As an industry, hand-combing has been dead for fifty years, although it may chance that individuals carried it on a little later. The manual crafts die hard and only now is Yorkshire losing the last remnant of the household weaving trade. The traces of this almost world-old craft of combing are being obliterated and exhibits of hand-combers' implements, such as one that has been set up in the Bankfield Museum, Halifax, will grow in interest with the years. The articles are as obsolete as flintlocks, yet they were the common tools of 10,000 workmen in England in the period from 1825 to 1840. The collection includes the post (or "posst" as the comber called it) in which the "pad" was screwed, two eight-pitch combs, as used for merino wool, a "com' pot" or heater, an oil can, an oil lamp, a "diz" or disc used to control the size of the sliver, and a machine for wringing tops after washing, such as was used in the farm-house combing shops in which much of the wool was once combed.

The post is an ordinary one without peculiar features of interest. The pad or arm is furnished with a screw for fixing to

the post at a height convenient to the workman. The pad is iron, might project ten or eleven inches from the post and is supplied with a hooked spike at one end and an upright one at the other. The former, A, Fig. 1, enters a hollow in the end of the comb handle and the latter, B, protrudes through a hole drilled about midway along the

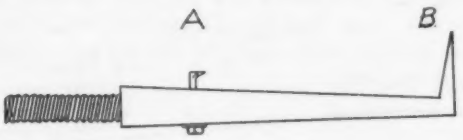


FIG. 1.

length of the handle. Together they hold the comb in the position shown in Fig. 2.

The combs have wooden handles and wooden heads, tipped with horn to provide an elastic bed for the roots of the teeth. They have eight rows of tapered steel teeth, set in at an angle of 60° and with the rows of teeth graduated in length. The first are

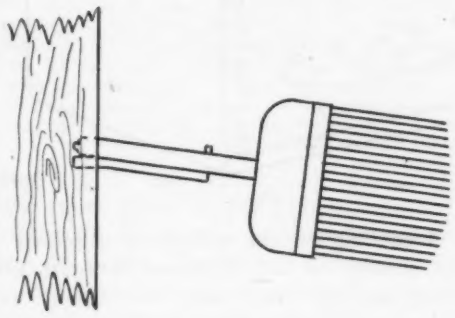


FIG. 2.

6 1/2 inches long and the last 11 1/2 inches. The handle measures about one foot. Combs with three or four "pitches" or rows were used for coarse wools. Two-pitch combs were used for first-combing strong English wools. The teeth in the vernacular were "broitches."

Before the combs could be used they had first to be heated in what the combers called the "com' pot." The earlier patterns were of earthenware and heated by charcoal. They had openings in their sides to receive the combs. The specimen preserved at Halifax is of iron and designed to consume coal, Fig. 3. On the iron lid of the stove are supports for a heavy circular slab of stone and in the intervening space the comb was set to warm. The old charcoal pots are remembered still by men who resorted to them in boyhood as sources of warmth and means of roasting potatoes.

The comber's lamp, Fig. 4, is designed for vegetable oil and one of the grievances of the employes was that the combers used to burn oil entrusted to them strictly for wool-oiling purposes.

The "maister" supplied the wool, the oil, the charcoal and the combs. The comber, who sometimes did the whole work and sometimes employed helpers, converted the wool into tops at a charge of from 5 to 56 cents per pound, according to quality. In the farm house combing shops the assistants were known as "lodgers" and they habitually slept in the farm kitchen around the charcoal fire. The larger combers brought

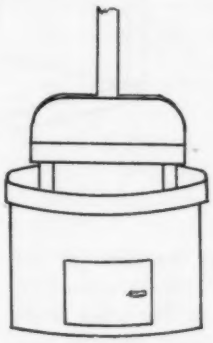


FIG. 3.

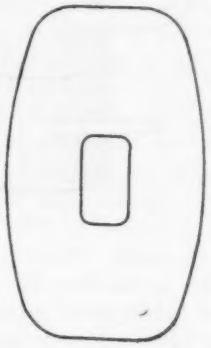


FIG 6.

away as much as a pack (240 pounds) of wool at a time and the smaller ones as little as a "lather" (24 pounds). According to the usual reckoning each lather of scoured wool should produce 18 pounds of top and 6 pounds of noil. To trust John Tester, leader of the combers' strike of 1825, the hours of labor were from 4 a. m. to 10 p. m. and the wages varied from $3.50 to $4 a week. On the other hand it was said that a comber could earn $5.00 by six days' labor and the evidence, printed and traditional, is that combers as a body refused to work regu-

larly and were greatly given to drink. Their toil was exhausting and their comforts meager.

The men had the assistance of the women and children of the family in "gigging" the wool, i. e., in straightening out tufts of it in a preliminary manner ready for "lashing" it into the teeth of the pad-comb. Both the working comb and the pad-comb were heated and the workman began first upon the longest fibers, working gradually to the shorter ones, leaving the noil at the roots of the teeth. After working the wool off the fixed comb into the other the positions of the combs were reversed; or the wool from the free comb was worked back into the pad comb. The noil was flung upon the floor and the long staple drawn off in sliver.

In forming the sliver use was made of the horn "diz" or disc, Fig. 6, which hung by a string upon the comb-post. The opening regulated the size of the sliver and contributed to uniformity, but if contemporary evidence can be accepted the best workmen disdained the disc and trusted to their own eyes and fingers. On the other hand there is evidence that the "diz" was used regularly in the re-combing or "straightening," which was done after backwashing. The last-named operation perhaps obtains its name from the fact that the hand-comber, resident near the mill, took his tops back to the washing-room to give them a soaking in hot water and run them through squeezing-rollers before taking them home again to administer the final straightening of the fibers.

It was inconvenient for those who did not live near the mill to take their tops back to the washing room before recombing and they made use of the apparatus shown in Fig. 5. The sliver was wrapped around the hooks seen in the illustration and then twisted by means of the handle to squeeze out the water.

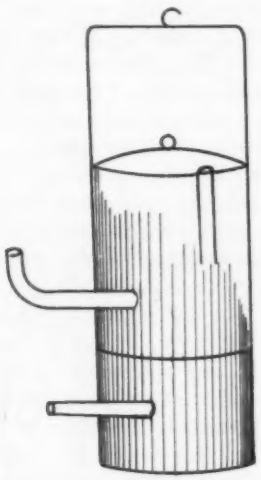


FIG. 4.

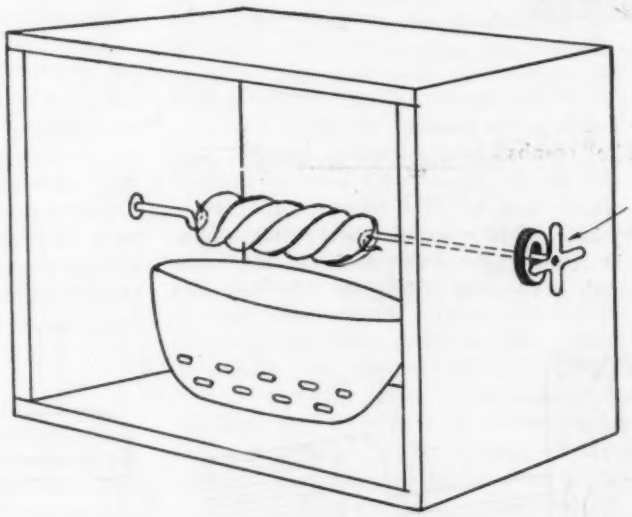


FIG. 5.

According to the testimony obtained by the curator of the Bankfield Museum neps found in the sliver after recombing were bitten out by the comber who spat them out in mouthfuls as they accumulated. The slivers were then examined to see that they were without faults and these lengths of 18 inches or so were made into balls or knots and put away in a moist place until Saturday, when they were returned to the mill.

The precise procedure varied in places and differed according to the kind of wool combed. At one period the combers worked for a class of master combers who bought raw wool and sold tops, entrusting the actual combing to commission hands, in the same way as Bradford topmakers do at this day. Later, the spinners dealt directly with the home working combers and this they did when the industry was in its last phase.

Questions and Answers

Under this head we undertake to answer, free of charge, to the best of our ability, questions pertaining to textile matters received from any regular subscriber to the TEXTILE WORLD RECORD. Questions should be stated as briefly and concisely as possible. Inquiries pertaining to textile processes, machinery, improvements, methods of management, the markets, etc., are especially invited, as well as any legitimate discussion on the views expressed. All inquiries must be accompanied by the name of the person inquiring, not for publication, but as an evidence of good faith.

If the question is not of general interest to textile readers and involves expensive investigation, a charge covering the cost may be made, of which the inquirer will be advised before any expense is incurred.

STAINS IN CLOTH

Editor Textile World Record:

I am sending you under separate cover two pieces of cloth, on which you will find yellow stains. Can you give me any idea as to the causes and remedy for this trouble? The trouble is more apparent on goods that are well milled and is most noticeable on ends of pieces. These goods are finished in sets of four and five pieces. They are soaped in the fulling mill, where they run from two to five hours. In the washer they are given sufficient warm water to bring up a good rich lather and are run from 1 to 1 1/2 hours in soap and rinsed one hour or more. They are then bleached in a sulphur house. The stains are not seen until after the bleaching, but as the goods are quite yellow this is not surprising. The soap is made with 9.7 ozs. tallow soap, and 2.9 ozs. 28 per cent. alkali to one gallon. This soap was lately increased from 8 ozs. soap and 2 ozs. alkali to overcome this trouble, and for several weeks it worked all right, but lately the stains have reappeared. I have tried several kinds of soap and different proportions, but have not succeeded in overcoming the difficulty, nor have I been able to remove the stains when once in the goods.

Fulton (1940).

Replying to the inquiry regarding the yellow stains in the goods, that it is difficult to correct faults in the finishing department unless one can study the conditions on the spot and draw conclusions therefrom. From the appearance of the cloth and the facts given, I draw certain conclusions and determine a course I would adopt if I were to deal with the difficulty.

It seems that the goods run a long time in fulling for cloth of that weight. If I understand correctly, the application of warm water in the scouring constitutes the full amount of soaping in this process, which is decidedly wrong. With the length of time given in fulling, the soap becomes pretty well exhausted, and does not clean the cloth properly.

When the soap is thus exhausted, there is a tendency for the foreign matter which the soap had taken up, to settle back into the cloth, and especially when the soap is further weakened by adding water.

The application of warm water is bound to bring up a lather, but it is likely to be a surface lather which fails to work properly within the fabric. Being deficient in life and body, it fails to hold in suspense the impurities the cloth contained. These impurities are not thoroughly carried off when the rinsing takes place, and the fact that the streaks show most near the ends of the cloth, where the folds from the sewing tend to retard the rinsing, strengthens my belief that this reasoning is correct.

For a remedy I would suggest the following course: Instead of bringing up a lather by the use of warm water, first open the outlet gates of the washer and rinse off the exhausted fulling soap, or a greater part of it. Then shut off the water and allow the goods to drain five or ten minutes, with the washer still running. Add sufficient fresh soap to produce a good lather. After running for a time, if the lather becomes very thick, the addition of a little warm water will help it to penetrate the cloth better. About forty-five minutes should be long enough to run the goods in the soap.

In rinsing off, no cold water should be used until the most of the soap has been carried off by the warm water. An additional advantage in rinsing is secured by shutting the outlet gates when the rinsing is partly done, allowing the washer to fill up sufficiently to cover and float the goods. This results in opening up the folds in the cloth, where the soap is more difficult to remove. With this treatment and the usual time for rinsing, the work should be satisfactory. If the soap is all right and the oil

used on the stock is not difficult to saponify, six or seven ounces of soap to the gallon ought to be sufficient. An inferior quality of oil on the stock will sometimes cause trouble that the best of soap will not overcome.

In addition to the above suggestions I would say that a decided advantage may be gained by the use of about one quart of ammonia to every 50 gallons of soap solution. This should not be boiled, but added after the boiling is complete, being well stirred in. This will not only help in the cleansing, but will insure a more ready discharge of the soap from the goods.

Elmo.

PRICES PAID FOR PIECE WORK

Editor Textile World Record:

Please explain how the prices paid for piece work on full fashioned knitting machines are determined. In our mill we are paying 35 cents per dozen on 39 gauge, 18 section boot leg silk, or a little less than 1 1/2 cents per stocking. The mill superintendent informed me that this price was paid because he could not secure help in any other way. It occurred to me that there must be some fair basis for calculating piece work prices on this machine and I would be glad to have you give me the information.

Knitter (1939).

The knitting of full fashioned hosiery requires as highly skilled help as any textile work. The knitting of silk is the most difficult. Manufacturers must be absolutely sure that they have men who will help keep the machines in perfect condition. It has been our experience that about three out of ten of those whom we have tried to teach in the last fifteen years have mastered the trade. We have been careful to start only those in good health, of good habits and having good eyesight. Those who had several years prior experience as helpers on half-hose leggers or on footers became the best knitters. Most of those whom we have taught have stayed with us. We have found that we must pay our men as much as they could get at other mills. Of course the cost of living, size and condition of machines and quality of silk used may safely be taken into account. Although conversant with the Cotton system of knitting from the two section hand frames down to the big power frames of today, we have yet to learn of any basis for calculation other than that of mutual agreement between employer and employes.

Winwick.

NAPPING WOOL BLANKETS

Editor Textile World Record:

What is the best way of obtaining a short, thick nap on wool blankets by the wire napping process?

Phoenix (1938).

The napping of wool blankets, to secure a short, thick nap upon the wire gig, requires very careful manipulation. The work cannot be rushed. Much depends upon the stock used, the quality and length of staple, whether the nap is to be of a soft, warm, attractive character, and give to the fabric a full, lofty handle. I have seen comparatively coarse and poor stock manufactured into very nice blankets, by careful finishing and a little manipulating in the napping.

Another matter besides the stock used is the make or weave of the fabric. If it is a plain weave, it will require more and probably harder napping. If it is desired to have the weave completely covered the goods should be napped wet, and before fulling, and in the fulling should be shrunk a little both ways. After this treatment the cloth will in many cases appear as if no napping had taken place, the fabric having an overfelted appearance. By running lightly over the napper, back and face, a nice soft pile can be produced that will give it a full warmth without weight handle.

If the fabric is made with a 4 or 6-leaf balanced twill considerable care will have to be taken as the nap will come quickly. If put on too heavy the napper rolls will have a tendency to pull out the long fibers and break up the twist of the yarn. It is possible, of course, to err on the safe side, but in napping, as in other things, there is that happy medium which is just right, and this point is only arrived at from careful observation of the make of the fabric, stock and the effect the gig has upon the work the first or second time over. If the napping is started too light, it can be increased gradually until the point is reached that gives the best results. If, on the other hand, the machine has been

set too hard at the start it should be set off at once. A little fulling or running a short time on the washing roller in a solution of mild soap will help to fill up the fabric and reduce the over-napped appearance. A little straightening out on the gig will put the finishing touch to the blanket.

I prefer napping blankets just after scouring while wet. This enables one to go slow, and prevents waste in flocking. Napping should be done before fulling, as the fulling sets the pile. The slight napping after fulling produces a soft pile, without digging in and disturbing the long fibers.

I have had blankets that had to be napped by degrees, that is, napped a little, then fulled a little, and so on, the operations being repeated two or three times. The result well repaid the extra labor. There is this satisfaction in the napping of blankets on the wire gig, once the proper degree of napping is obtained, it is possible to repeat the process indefinitely, as the wear and tear on the gig is as nothing compared to the old teazel gig. Pine Tree.

No machine has performed a more important part in finishing than the teasel gig, whether for raising a thick, soft nap on a blanket, or in clearing out the felt or nap on a cassimere suiting. It has done its work well under skillful handling and no other kind of handling could produce good results. Possibly no other machine used in the manufacture of cloth requires more sound judgment and closer attention than the teasel gig. There is the classifying of work, or rather the grading of teasel slats according to the condition of the teasel breakers. The partially used work would be graded from 1 to 4, according to the requirements of the goods being finished. A mistake in setting too close or using too sharp work might mean the ruin of a fabric, but with careful handling the teasel gig has worked wonders. Today the teasel is being replaced by the wire machine. Although many stand firmly for the teasel, where new machinery is being put in the wire has the preference and it is certainly gaining favor with the finishers. I have used both and can say that if the wire napper is studied and cared for as well as the teasel gig has been, just as good work can be done and more quickly. The time used in changing slats is saved and also that used in cleaning the slat. There are a few makes of wire napping machines that have fine adjustments and can be changed to nap more or less without stopping the machines, and can be set so lightly that the touch of the wire is just perceptible on the cloth. A good way to insure slow napping and to prevent waste is to moisten the cloth well with water. This puts the fiber in a condition to be raised and combed out without any pulling or yanking, as is the case in gigging or napping where the goods are not moist enough. It also saves the goods from that dry, harsh feel which is strongly objected to by the trade.

In the scouring and napping of all wool blankets great care must be used in the scouring, because a short, thick nap is required and all dirt or soap must be thoroughly washed out, leaving the fiber clean. This greatly helps in obtaining that lofty, warm feel a first class blanket should possess. Make up 50 gallons of soap as follows: 12 lbs. of any good, hard soap, and 10 lbs. alkali. Boil soap in a little water until dissolved, then add the alkali; boil 1 hour and fill up and let cool. Run the blankets into the washer, wet thoroughly with warm water about 110° F., having a few inches of warm water in the bottom of the washer. Add a few pailfuls of soap until it lathers. See that the soap is stirred well before using so that it will run even. If a little steam has to be used warm soap will do no harm, but hot soap will do a great deal of harm. Run 30 minutes in soap, drain off and put in more soap to raise a second lather. This lather should be almost snow white and thick. Run 20 minutes, warm water 20 minutes more, rinse in cold water 30 to 45 minutes. The blankets are now perfectly clean and smelling sweet, but before putting them on the napper, I would caution the scourer about the soap. Never throw soap into the washer in lumps, it does no good, but often causes trouble. It wallops around the washer and finally gets shelved on some part of the machine, usually dropping onto the goods just as they are being taken out.

It will be found of great benefit in scouring to have a square hole cut on each end of the washer, about 18 inches from the bottom; a slot on each end the whole width of the washer is still better. After the goods have run in the soap long enough, turn on the warm water, keeping the bottom gates closed. Thus the soap floats on the water and does out first. Besides this 18 inches of water makes a good bath for the goods.

The goods should now be run through the wringer only and folded for the napper. Set the napper to touch the blankets lightly. Examine the end as soon as it comes over to see if it is touching hard enough. If not then set up the contents until the nap is long enough. If it is necessary to raise the nap quicker, change the gear so as to have the napping rolls work faster, but do not set up the cloth any closer. After running about five runs this way, reverse the ends and give five runs more. Now reverse sides and give five runs, reverse ends and give five runs more. In making a test it should be examined every run. If after napping both sides as above it is found that the nap is not quite full enough, it may be necessary to set the blanket a little closer to the napping rolls and moisten again with a sprinkling can. Give a run of two each way until the required nap is obtained. Make a note of the set and gear used and succeeding blankets can be finished with almost the same runs. Resarf.

CALCULATING COUNT OF YARN

Editor Textile World Record:

I want to make a stocking to weigh 1 lb. 8 ozs. from mule spun yarn, 176 needle. What is the best way to calculate the number of yarn to use? Weymouth (1937).

An experienced knitter to whom the above question was referred writes as follows: In reply to your inquiry as to a method of calculating the count of yarn required to make a stocking weighing 1 lb. 8 ozs. from mule spun yarn on a 176-needle machine, I regret that I am unable to give you any rule for the solution of this problem. I rely on past experience in designing stockings of certain weights and doubt very much whether a table or rule would be of service in making this kind of a calculation. Dorsoma.

SIZES OF SWEATER COATS

Editor Textile World Record:

What is the correct assortment of sizes for men's, women's and children's sweater coats? Knitter (1942).

After an experience of some years handling coat sweaters, we find that the following scales of sizes sell out fairly even:

	28	30	32	34	36	38	40	42	44
Men's					2	4	3	2	1
Ladies'				1	3	3	3	1	1
Children's ...	2	3	3	4					

In handling ladies' coat sweaters we notice a heavier sale on the small sizes in red, as against the larger sizes, but this is counterbalanced by selling more of the larger sizes in grey. Fillmore.

THE MANUFACTURE OF RIBBONS

Editor Textile World Record:

Although we are not ribbon manufacturers, yet we have among our machinery a silk ribbon loom, equipped with a batten for twenty spaces of two-inch width ribbons.

What prospect would there be of our being able to run this loom at a profit at the present time, taking into consideration the current prices of raw and spun silk, and the figures at which finished ribbons are selling?

We work ten hours a day, and the loom can be run at ninety picks a minute, and we were thinking of making a certain ribbon having eighty-four picks per inch. Manufacturer (1909).

The question of profit making depends upon the cost of production and the state of the goods market.

The cost of production is made up of the raw material, the labor, and the general expense.

Then there is the expense of marketing the product.

Under ordinary conditions, a modest profit —say 4 to 8 per cent. of the mill cost—can be obtained upon plain goods, if the demand in the market is active and at a fair level of values, and if the mill making the goods holds its raw materials at reasonably low figures, and if it is of sufficiently large size and so efficiently organized that its production will be relatively large, making its general expense per yard relatively low, and if the unit cost of its labor is cheap.

This latter may be due either to the help

being willing to work for a small weekly wage, or may be owing to their ability to handle so much machinery per individual that even with the high weekly earnings the unit cost of the work done will be low.

The general expense of a mill, which includes interest on the capital invested, depreciation of plant, and every kind of expense not included in the material and labor items, is fairly constant, and so long as the mill is in operation it is almost as great when work is slack as when the mill is running full. This item of the cost is therefore profoundly affected by the production, decreasing as the product increases, and vice versa, and the larger the mill the lower should be the unit cost for general expense.

At the selling end, the concern that should do best with its goods would be the one that sold direct, carried its own credits, and had a large turnover with a small selling force, as compared with some smaller concern that had to pay large charges to a commission house for disposing of its product.

Your correspondent gives us a very few facts to work upon, but we will suppose that he has bought, or can buy, his materials as cheaply as his competitors and that he is in a position to sell his goods without undue expense. So far, so good.

We now come to the questions of labor and expense, and here we find that with such a loom as he refers to he is hopelessly outclassed. Its narrow width is fatal.

His loom will weave 20 spaces × 2 inches = 40 inches of cloth, while a loom of the kind ordinarily used will weave 42 spaces of 2-inch ribbon equal to 84 inches of cloth. Some looms will do more than this, and faster speeds than 90 picks a minute are common.

In ribbon weaving a weaver will only run one loom, and for the same weekly wage the unit cost of the weaving on the 20-space loom would be approximately twice what it would be on the 42-space loom, making a large difference in the labor cost.

For the same reason, the expense would also be greater, as the cost of operating two 20-space looms would be distinctly more than the cost of running one of 40 spaces. Such narrow looms as these have practically gone out of use.

It may be said here that the product to be looked for from a ribbon loom, on plain weaves, will generally vary between 60 and 70 per cent. of the theoretical production, dependent upon the density of the warp, the quality of the silk, character of the weave, speed of the loom, etc.

In the present instance, with a run of 60 hours a week, with the loom beating 90 picks a minute, and with 20 spaces of 84 pick ribbons, this would give a weekly output of from 129 to 150 pieces of ten yards each.

Coming now to the question of market prices, it must be said that the conditions at present are deplorable. In the ribbon trade, as in most branches of the silk industry, the supply of goods offered on the market seems to be far in excess of the present demand, with the result that prices are practically dictated by the buyers and values seem to have no relation to what the goods can be sold for.

Raw silk is very cheap (though spun silk is not), but, cheap as it is, goods are relatively cheaper, and any mill that today can do even a fair business, and on a very close margin of profit, must be uncommonly well organized both at the mill end and at the sales department, and must have been fortunate both in its raw material purchases and in the styles that it has put upon the market.

The manner in which ribbons are priced will also have a bearing upon the situation.

The same price per ligne will be quoted on a range of ribbons running from narrow to wide.

On the basis on which manufacturers are now pricing their goods, it seems to be an accepted condition that on the narrow widths—say 10, 13 and 17 lignes—a smaller loss must be expected; on medium widths—say 21 to 25 lignes—they expect to get back only their cost; while on the wider widths some profit is looked for, the profit expected being larger as the goods get wider.

As a two-inch ribbon is about 23 lignes, it falls into the "no profit" class at the start.

Of course, if your correspondent could find some customer who would be willing to

engage the product of his loom on some rich or special quality of goods, and on which a sufficiently handsome profit could be got that would much more than offset the serious drawbacks referred to, it might be profitably operated, but if he expected to have to meet the ordinary market competiton he had better consign his loom to the scrap heap than attempt to run it.

The advice which "Punch" long ago gave to "a young man about to be married" would be applicable here,—"Don't."

James Chittick.

WEAVING WIDE DIAGONALS

Editor Textile World Record:

Can you give me directions for weaving wide diagonals with a small number of harnesses so as to produce effects that ordinarily can be obtained only with the jacquard loom? I understand that this can be done, but do not know how to construct the weave pattern. Weaver (1943).

"Weaver" undoubtedly has in mind the method of dovetailing two diagonal weaves, both of which require but a comparatively small number of harnesses, but which when dovetailed together give very wide diagonal effects. This class of weaves will be described in the course of two or three months in "The Hand Book of Weaves" now running in this magazine.

SPLIT LAPS IN CARDING

Editor Textile World Record:

I notice on page 713 of your September issue a letter by "Corella," in which he gives a remedy for split and uneven laps. I can see no reason why this arrangement should make the slightest improvement in the condition of the laps. There is nothing original or different in this method from the regular way of mixing and picking cotton, except that a woolen picker is used in place of a cotton picker. As the construction of the machine and treatment of the stock is so nearly alike in both pickers, I can see nothing to cause the least improvement in the unwinding of the laps. There are several things "Corella" has not mentioned which will overcome the splitting of picker laps. Some of these are mechanical devices and some are the result of the preparation of the stock. Forfar.

SETTING OF WORKERS AND STRIPPERS

Editor Textile World Record:

We are running our cards on stock to be made into felt goods. This stock contains wool, cotton and shoddy in varying amounts, according to the quality of goods desired. There has been some discussion among carders as to the setting of the workers and strippers on the main cylinder. One carder maintains that to get good results from practically two cards, the setting of all workers should be the same. I maintain that the last two should be set closer than the first and second workers. We are using all fillett clothing No. 33 wire on workers and main cylinder. Can you advise me which one has the better argument in regard to setting the cylinders for best results? At present we are running workers set about 32 gauge.

Exeter (1935).

The 32 gauge is all right and the workers should all be set the same. One thing can be done that will greatly benefit this class of work, and that is to have the worker pulleys all of different sizes. Start from the feed end of the card and have each pulley one-quarter of an inch larger than the one before it. This will make a more even mix and smoother roving, the stock will spin better and make better yarn. It is also a good plan for second breaker card. The idea of setting a part of the workers off on a finisher card on this class of work can have but one result. The first that are set off will deliver the long stock and retain the short, consequently the long stock will go forward first and be put into the roving in the center of the strand; this will put the short stock on the outside, which is just the reverse of what it should be. Lytton.

The first worker should be set with a 20 gauge open; the next worker set with the same gauge, but left a little looser; the next tight, and then graduating more closely until the last worker is set as close as possible without striking the cylinder. Set the strippers the same as the workers to cylinder, and set the workers as close as possible to the strippers. Set the doffer close to the cylinder. The finisher or last card should be graduated only a little closer. Gommence the first worker with a 27 gauge loose; the next one set a little close; and so on until the last one next to the fancy is set the closest. Sam Driver.

Knitting Department

THE KNIT GOODS SITUATION

Some improvement has been noticed in the knit underwear end during the past month. Some fair size duplicate orders have come to first hands, but for the most part, these have been for men's fleeced and ribbed goods. Prices obtained are slightly lower than on early orders. Sub-standard fleeces weighing about 12 pounds to the dozen have been quoted within the past week as low as $3.27 1/2. A few manufacturers who are still making standard fleeces report that there has been a good demand for these and early prices have so far been maintained.

The call for men's ribbed goods has been heavy on the lower grades and those mills that are in a position to make 11 pound goods at $3.37 1/2 to $3.50 have all been busy of late, while those making the 12 pound at $3.65 to $3.75 have not as a rule been running full time.

So far as we can learn, buyers are not showing any inclination to place additional business on ladies' ribbed goods. The manufacture of ladies' 25-cent ribbed vests and pants is in the hands of a very few factors, and while the majority of them are still asking $2.00 for 6 pound goods, it is reported that they may be bought at $1.92 1/2 to $1.95 from one or two of the manufacturers who are open for business.

There has been a very heavy demand for low priced extra size ribbed vests and pants this season, probably due to the fact that the ordinary sizes made of light weight yarn have been almost too small, except for very slight figures. The trade in general have come to learn that they must ask for extra size garments in these light weight fabrics in order to get them large enough. The 7 pound extra sizes are held firmly at $2.25 as yet, but there are in the market some weighing 6 1/2 pounds which may be bought at $2.20. It is not believed that buyers generally have any large stocks of this class of merchandise, but are holding off the placing of additional business until the raw material condition settles itself. Yarn quotations show a difference of about 2 cents per pound on Southern carded cops No. 10 from the quotation made in January last, when the bulk of this business was placed.

Some lines of heavy weight goods are scarce, notwithstanding the backwardness of buyers in placing early orders. The lines in which the shortage is chiefly found are children's goods. Makers of children's fleeces and ribbed goods have received many orders during the past month and are now from three to four weeks behind. As a result of this condition, one manufacturer has advanced his prices from 1 1/2 to 2 1/2 per cent., and still buyers continue to send in the business.

Children's combination suits are in good demand and there is every indication that single piece garments will supplant the two-piece suits almost entirely before many seasons. Retailers report that in many cases mothers who do not buy combination suits for themselves seem to appreciate the advantages of the single piece suit for their children. Retail merchants the country over are studying the combination suit business more closely. Some of the larger stores have separate departments for the exclusive sale of combination suits.

One of the most important offerings in the market during the past month on spring goods was made by the Capron Knitting Co. of Utica, N. Y. They have been showing a 32-gauge balbriggan garment at $1.85. This concern issued a circular letter, stating they could make 1,000 cases of these goods, and it is understood that jobbers placed their orders so freely as to absorb the lot in a few days. This is said to be the first time that a 32-gauge garment has been sold at a price so it would reach the consumer for 25 cents. As is usually the case at this time of the year, an active demand has sprung up for wool underwear of all descriptions. While the

early business done on flat goods did not assume any large proportions, manufacturers of this class of goods all report that they are quite busy. Some of them have orders to run their mills until the middle of November.

HOSIERY

Manufacturers and agents report a fairly active demand for hosiery during the past month, not that there has been any boom, but a steady business has been done on heavy weights. Many duplicate orders have been received and in addition to that, light weights for both immediate and spring deliveries have been called for largely. The amount of light weight merchandise bought for immediate delivery indicates that stocks in the hands of retailers are low and also that consumers are using light weight goods more than ever before in cold as well as warm weather.

Some buyers who placed spring orders in the months of June and July have apparently become anxious about the prices paid and, having in mind the recent decline in the price of raw cotton, have asked manufacturers for revised prices on their orders. In most cases, the makers have replied that the prices made at the opening of the season anticipated lower cotton and the quotations made then were based on raw material at from 11 to 12 cents a pound, and that if the slump in cotton had not occurred, it would have been necessary for them to take a loss to fill their orders.

Silk hose for men and women continue to be popular, and makers of cotton goods have been put to their wits' ends to get business. This has been accomplished in some cases by putting in new lines of very fine gauges, and 220-needle hose have sold well as high as $1.75 per dozen.

Hose and half hose made of vegetable fiber with mercerized heels and toes have been shown recently at $1.80 to $1.90 a dozen, and buyers have placed orders, though rather conservatively, on these lines. The wearing qualities of vegetable silk has been questioned by many and the general impression seems to be that when the goods are delivered to the consumers, the retailers will have trouble in taking care of the complaints that are bound to come.

The manufacturers of "Togards" have recently introduced a neat device which they have named "Helons." This is shaped like the heel of a stocking, may be worn either underneath or over the hose, and is claimed to prolong the life of the sheer, thin hose so popular at the present time. These are made in three sizes and three colors and are found in many up to date hosiery departments.

The Wayne Knitting Co. are showing a

A FANCY KNIT HOOD.

woman's stocking made with the flare top that they are advertising to some extent. It has an ordinary size leg up to the knee, but is much wider at the welt and is intended for medium size and stout women who do not need the extra size width, except near the welt. This is supposed to be a particularly desirable feature in silk hosiery.

FANCY KNIT GOODS

There has been a marked improvement in the call for coat sweaters during the past four weeks. Buyers did not place early

orders in large volume and there has been such a heavy demand of late, that most manufacturers have been taxed to the limit. Desirable styles of ladies' goods, especially those with high collars, cannot be obtained as fast as wanted.

Several new styles are being shown, some with Norfolk and many with sailor collars. In addition to these are several styles shown with pointed collars with tassels in imitation of hoods.

There is a good demand for heavy weight, plain stitch shaker knit coats, especially for young ladies. Most of these are being bought with Byron collars.

The call is for white, cardinal being a good second in fancy stitches, and dark maroon in plain stitches. Grey is also bought freely and there is a sprinkling of navy, seal and green following in the order named.

Angora coats have sold freely, particularly in the two-toned effects, and in many lines hoods are sold to match the coats.

Manufacturers report that a large proportion of the duplicate orders for sweaters received since July 1st are for those made with some sort of a high collar, either military, Byron or storm design.

Some new things are being shown in crocheted headwear. One in particular that seems to be meeting with ready sale is the hand crocheted hood shown in the illustration. This is made by one of the New York City manufacturers of worsted roving and gets to the retailer for $1.50. The demand for hand knit eiderdown aviation turbans continues fairly active and it looks as if this popular cap will have a large sale during the coming season.

The value of cotton manufactures imported into Belgium in 1909 amounted to $49,209,711, and the value of those exported to $54,004,530.

The United States imported wool from Turkey to the amount of $2,088,002, as against $679,590 in 1908. In 1910 the value of wool exports to the United States from Turkey amounted to $777,892.

A PROBLEM IN KNITTING MILL MANAGEMENT

BY WINWICK

Over twenty years ago it was the privilege of the writer to visit some shoe factories and watch the operatives at their work. The shoe machinery was wonderful and almost human in its adaption to the work. But the one thing, above all others, that seemed most remarkable was the system and precision with which the cases were turned out. The stock, after being cut, for a case of shoes was placed upon a truck and rolled to the operatives in the various departments. Each operative in turn contributed his part of the work until the case was completed.

Do we have any such system in hosiery mills? Well, not throughout the mill. Instead, what do we see? Some mills, probably most mills, today require that their overseers of knitting departments shall knit as close as they can to their orders. Each day the work is counted by the clerk, then picked up by some boy or second hand and thrown into cars holding from three to five hundred dozen pairs, regardless of their gauge, style or size. They go first to the inspectors where they are dumped in a pile. After inspection they are taken to the seaming room and sorted for gauge. The next step is to divide them among the loopers. Each girl must have an equal number of black or white and as many worsted or cotton as the case may be. After looping they are again thrown into cars and taken to the turner boys. These boys usually take this mixture as it comes and turn it right side out. The goods are next taken to the rough mending department. They must now be sorted for the menders that each may get a fair chance as the work is again strewn around the room. After being mended the goods are taken up into cars and from them sorted into racks for styles and sizes.

Each day the overseer of the mending department looks over the racks and if he thinks he has enough goods of a certain style to fill an order he has them taken out and counted. If he is fortunate enough to find the whole case it is sent to the dye house. If

not, as is often the case when the goods are needed for immediate delivery, he has the privilege of going back through the other departments and finding the goods if he can. Often he tells the overseer of the knitting department that the case was never completed, although there is positive evidence on orders and time sheets that the goods were delivered three weeks prior. Of course they were never knit because they cannot be found. The machines must be reset, yarns changed and enough dozens knit to replace those lost. With wisdom born of experience these will probably be sent through in a special lot under a rush ticket. After the stockings go to the dye house they are seldom lost, because they must be dyed according to the stock of which they are knit. Also on account of the difficulty of sorting after they are untied for the dye machines they are either tacked or the sizes are dyed separately. Thus the cases maintain their individuality in the dye house, although it is a common custom to dye large cases in two or three batches. These batches are boarded as they come from the dye house and are easily assembled for finishing and packing.

One thought has bothered me seriously. Yes, even kept me awake nights. It is this. Why must a case of stockings as soon as it leaves the knitting room be scattered to the four winds of heaven, or more accurately, to the four corners of the mill? My experience has been that it takes about four weeks to get a case of hosiery through to the finishing room by the usual way. For five years, as an experiment, I have, with the superintendent's permission, sent my work out in two batches. The loopers must keep the batches together. The overseer of looping must send them along complete as he received them, each batch being supplied with a ticket. There are from one to four batches per case, according to the size of the case ordered. The mending room must also keep these batches together. By following the numbers on the batch tickets it is a simple matter to get the work through in order. We also use blue batch tickets for samples, red tickets for rush orders, with white on the usual line.

How long does it take to get the work to the shipping room in an average week? In emergencies we mark "express," and it takes two days or less as per size of case and finish required. What would be the result if the shoe-shop method be adapted to our work, each operative being required to keep the work as per batch ticket? First, we would save all cost of sorting. Second, we could deliver promptly with three weeks' knitting less in stock. This to any mill would mean the annual saving of no inconsiderable sum of money.

KNITTED NECKTIES

Sept. 19, 1911.

Editor Textile World Record:

In reading the article on page 689 of the September number, entitled "The Pressing, Finishing and Boxing of Knitted Neckties," by Laramie, we would say that the machine referred to in the article is an exact description of the steaming, pressing and stretching machine built by us and which, to the best of our knowledge, is the only one built in this country for this line of work.

Yours very truly,

John Eppler Machine Works,
629 Filbert St., Phila.

MOUNTING HOSIERY TRANSFER STAMPS

The Meyercord Co., Bulletin Building, Philadelphia, and Chicago, are now furnishing a suitable stove in connection with their method of mounting gold transfer stamps. After the stamps are laid on the wet transfer felt, they are then placed on the hosiery, which have been laid in piles of a dozen, then pressed with a hot iron, with a slight sliding motion, then the paper is lifted off and the operation repeated on each successive pair. A special iron has been devised for this purpose, and now a little stove which will accommodate two operators adds still further to the convenience of the work and the outfit.

The principal exports from Great Britain to Turkey are: cotton piece goods, $21,328,064; woolen and worsted piece goods, $2,834,040; cotton yarn, $2,547,652; cotton goods other than piece goods, $1,538,082.

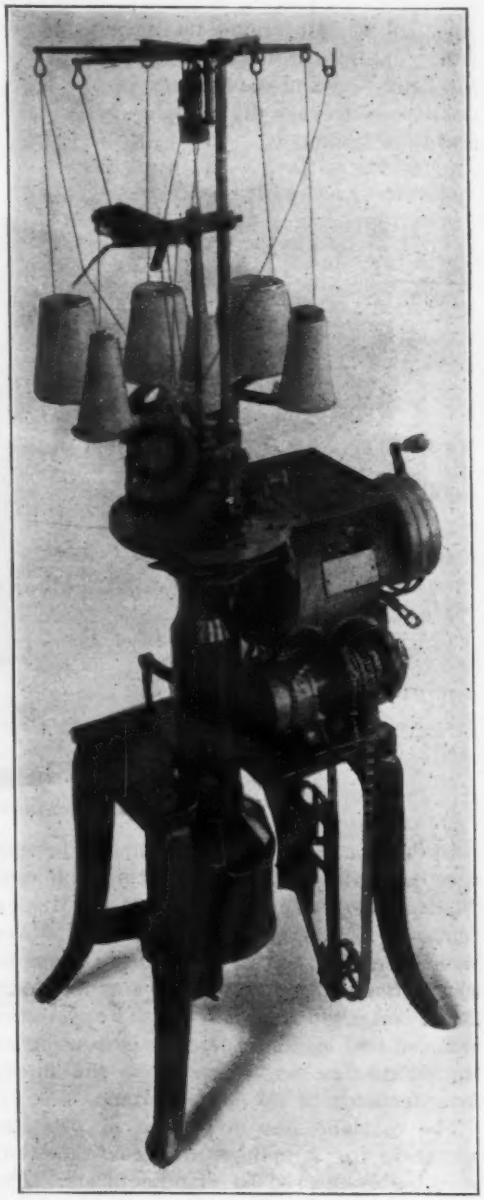
A NEW HOSIERY MACHINE

The illustration shows a new hosiery machine which is being brought out by Scott & Williams, Inc., and the George D. Mayo Machine Co., known as Model B. It is a machine of the revolving cylinder type and is particularly adapted for fine gauge work, including the silk hosiery which is now so much in demand in both plain and plated styles.

This machine is a combination of some of the best patented features of the Mayo machine and the Scott & Williams full automatic revolving cylinder half hose machine. Perhaps the most important feature is the increased number of yarn changes that are made possible by the four regular changing fingers together with the fifth that may be added if no plating is desired. By the use of these four or five changing fingers different sizes of yarn may be introduced into the ankle and leg of the half hose which so varies the elasticity of the fabric as to approximate very closely the shaping which has hitherto been possible only on regular full fashioned machines. The single stitch cam which is a feature of the Mayo machines and the revolving inserted wall cylinders of the Scott & Williams machine are features of this new Model B. It is the first to embody the four yarn changing fingers and the fifth that can be added as a five-colored striper without extra complications.

The new Model B machine can be used with yarn change, as a plain machine, as a plating machine, as a double sole machine, and in several other combinations if desired. In making ladies' hosiery the machine is equipped with a web take-up which insures good work, and by using the four-finger combination, any or all of the following operations are possible: garter top, with entire change of yarn by use of one finger; plating, or main yarn for body and foot of hose, with second finger; high spliced heel and double sole with third finger, thus avoiding running the high splicing thread through a take-up, or tension, as is necessary with all other machines; with fourth finger an entire change of yarn in heel and toe, which may be different than that used for garter top if desired.

On half hose one finger can be used for the main yarn or for plating; another finger may

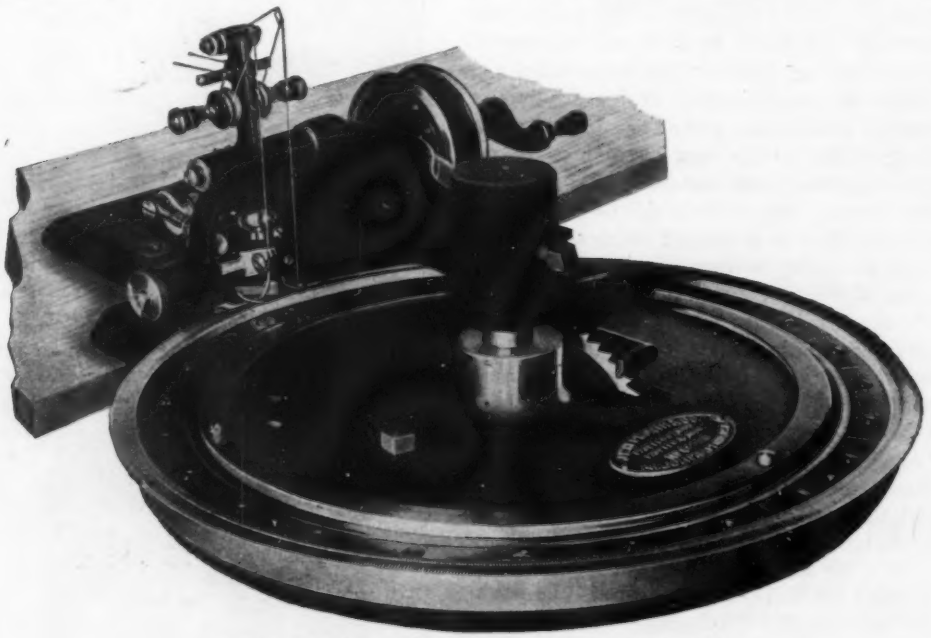


A NEW HOSIERY MACHINE.

be used for high spliced heel and double sole; another finger for entire change of yarn in heel and toe, while the fourth finger may be used for a tip heel and toe, for a change of yarn several courses before the toe to strengthen the looping course, or for a heavy yarn to be run several courses below the cuff. The fourth finger, in fact, can be used for heavy or fine count yarn in the leg or ankle so as to vary the elasticity of the fabric and thus fashion it.

THE HEPWORTH TWO-THREAD ELASTIC LOCK STITCH DEVICE

The illustration shows the new two-thread elastic lock stitch device manufactured by John W. Hepworth & Co., Lehigh Ave. and Mascher St., Philadelphia, Pa. This attachment is easily applied to the single stitch machine, there being no holes to drill, the new parts taking the place of those which are removed. The mechanism of the attachment is the same in every respect as the new Hepworth two-thread looper so that it enables the single stitch machine to be easily changed to a two-thread looper. A number of these attachments are in operation in some of the largest mills in the country and giving entire satisfaction. Further particulars can be obtained from the builders.



THE HEPWORTH TWO-THREAD ELASTIC LOCK-STITCH DEVICE.

In developing this machine the object has been to make it as simple as possible and the combined efforts and talent of Messrs. Scott, Williams, Swinglehurst and Mayo have been devoted to producing a machine which should combine in their simplest form the advantages of the patents and experience of these two leading hosiery machine building companies, and adapted to the up-to-date demands of the hosiery trade.

The machine has now been in practical operation for a number of weeks and has been highly praised by manufacturers. The large number of orders already received will keep the plant busy on this type of machine for over six months.

English cotton piece goods went abroad to the extent of 2 4/5 billion yards in the first five months of 1911, against 2 1/3 billion in the same period last year, and 2 1/5 billion in the 1909 period.

AUTOMATIC CUTTING MACHINES

The Artos Engineering Co., 286 Lake St., Milwaukee, is putting a new line of automatic cutting machines on the market which embody some novel and interesting features and deserve the attention of the trade. Fig. 1 illustrates the style K N cutters used for cutting all kinds of knit goods such as tubing, lining, etc., of any weight in widths up to 6 inches and lengths of 4 to 36 inches and

FIG. 1. THE ARTOS AUTOMATIC CUTTER. STYLE USED FOR CUTTING KNIT GOODS, TUBING, LINING, ETC.

longer. These machines are equipped with a clutch pulley for power drive and a counter registering the number of pieces cut off. The output is 100 to 120 pieces per minute, all cut to the right length.

The style G M cutters, Fig. 2, cut light materials like bands, tapes, braids, strings, etc., as used in almost every branch of the textile trades. These machines cut pieces from 1 1/2 to 18 inches long at the rate of about 200 per minute, and may be either hand or power driven. They have proven to be great time and money savers in both stock rooms and factories.

All styles of Artos cutters consist of two pairs of mechanically operated shears and two levers which feed the material into the machine. Like every good pair of scissors these machines cut any kind of material, the blades are of best grade steel and can easily be removed for grinding, which may be done by any machinist. No adjustment is required when cutting materials of various thicknesses.

The length of the pieces is adjusted by two gauges parallel to the shaft around which the goods wind before the cut is performed. The gauges are simultaneously moved by a right and left hand screw and any length can be adjusted almost instantly by means of a graduated scale on the gauge bar. The Artos cutters have been in use for about a year in underwear and other knitting mills, glove and mitten factories, etc., and have

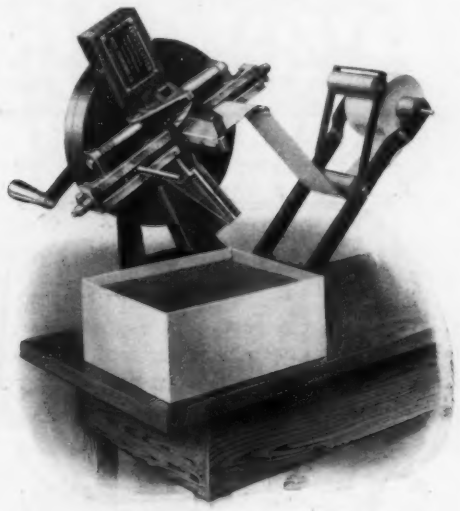


FIG. 2. STYLE USED FOR CUTTING LIGHT GOODS.

proven very satisfactory. Their simplicity, reliability and accuracy are greatly appreciated by the users. Any employe can adjust and manipulate them without danger of getting hurt. The Artos Engineering Co. builds these machines in various styles for cutting on a bias, for cutting pieces up to and over six yards long and will furnish any further information desired. Machines for cutting materials of greater width are under construction.

The world's production of cotton in 1910, as measured by the factory supply, was 19,171,000 bales; in 1909 it was 16,776,000 bales and in 1908, 19,636,000 bales.

A KNITTED FABRIC

A method of producing a rib knitted fabric having three different widths and thicknesses, all made with the same yarn, has recently been patented. The inventor states that the fabric can be readily made on a circular knitting machine by shifting the cams to correspond with the widths and thicknesses. Fig. 1 is a view of a part of a one and one rib fabric made in accordance with the new construction; Fig. 2 is a view of the cylinder and dial of a knitting machine showing the cylinder needles casting single loops and the dial needles double loops; Fig. 3 is a fragmentary view of a dial and cylinder of a knitting machine showing the dial and cylinder needles knitting a plain rib fabric; Fig. 4 is a similar view to Fig. 3 showing the cylinder needles forming double loops and the dial needles forming single loops; Fig. 5 is a like view showing both cylinder and dial needles forming double loops; Fig. 6 is similar to Fig. 3, showing the needles just after they have drawn in to cast the double loops.

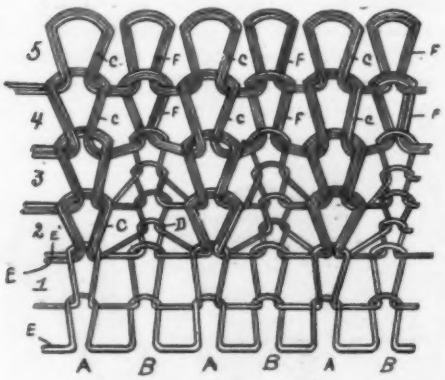


FIG. 1.

The plain stitch or cylinder needle wales are represented by A and the rib stitch or dial needle wales are represented by B. The web in courses or strands 1, 2, 3, etc., represent a one and one rib fabric. In the courses or strands, 1 and 2, there is shown the ordinary plain rib fabric which will obviously be the narrowest and thinnest part of the fabric, for the reason that it contains a single yarn to the loop. In the courses, 2 and 3, the cylinder needles, A, are shown as casting double loops and holding double loops as at C, the dial needles, B, however, are casting single as at D. In other words, the cylinder needles take the thread at every other feed, but are not retracted to knit and therefore tuck or hold their taken thread without interlooping it at alternate feeds.

The cylinder cams of the knitting machine are at the proper time automatically shifted, so that the cylinder needles cease to form single loops at each movement upward and downward, but instead, as the cylinder needles, 10, move upward and the loops are shoved back on the shank, 11, of the needles, 10, the needles catch the thread, E, and then descend a very short distance, where they remain in constant vertical position until after the next movement outward of the dial needles, 12, at which point or time the cylinder needles take on a second thread, E′, as shown more clearly in Fig. 4. The cylinder needles, 10, then draw both threads, E and E′, through the loops already formed on the shanks, 11, of the needles, 10, as the needles move down again to the lowest or casting position. The movements of the cylinder and dial needles just described whereby the cylinder needles form two loops and cast two and dial needles form one loop and cast one, make the second thickness and width of the fabric.

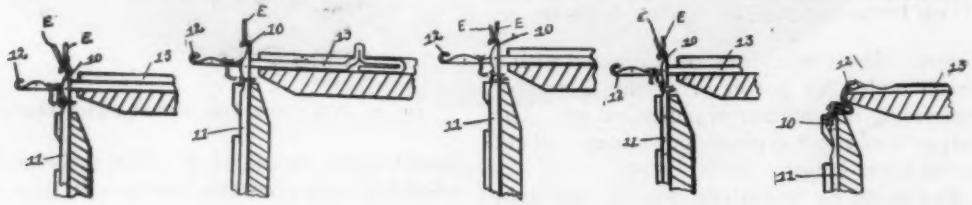


FIG. 2. FIG. 3. FIG. 4. FIG. 5. FIG. 6.

The fabric made from the above described stitches differs from the ordinary half-cardigan stitch in that the fabric employs a one and one or Derby rib, as modified by the effect of the alternate needles, throughout a portion of the fabric, taking on thread at every feed and casting off double at the alternate feeds, while the remaining needles are knitting normally, and as modified at another portion of the fabric where each of the needles takes on thread at every feed and casts off double at the alternate feeds. To accomplish this effect the needles are controlled by the automatic shifting of the cams of the knitting machine at regular intervals. A single thread is fed at each feed of the machine.

In courses, 4 and 5, both cylinder and dial needles are shown casting double loops and holding double loops, which effect is accomplished by both sets of needles, the cylinder and the dial, going through the same movements just described concerning the cylinder needles. When the time arrives to add the third or maximum thickness and width to the fabric the dial cams are automatically shifted so that the dial and cylinder needles cast double loops and hold double as shown more clearly in Figs. 5 and 6, and as indicated at F, Fig. 1. In this effect the cylinder needles move up to take on the thread, E, and simultaneously the loops formed in the hooks of said needles, 10, move back upon the shanks, 11, of the needles, which then move downward a very short distance and there remain in constant vertical position until after the movement outward of the dial needles, 12, so as to hold the two loops on the shanks, 11, of the needles, 10, until the movement of the dial needles, 12, outward, at which time the needles, 10, take on the second thread, E′, and then draw both threads, E and E′, through the two loops already formed on the shanks, 11, or the needles, 10. Similarly the dial needles, 12, move outward to take the thread, E, and there remain, after moving in a very short distance, so as to hold the two loops formed on the shanks, 13, of the needles, 12, until after the next movement upward of the cylinder needles, 10, at which time the needles, 12, take the second thread, E′, and then move inward to casting position drawing both threads, E and E′, through the two loops already formed on the shanks, 13, of the dial needles, 12.

Fig. 2 shows the movement of the dial needles and cylinder needles reversed. The dial needles are forming two loops and the cylinder needles are forming one loop, this being the reversal of the movement of the dial and cylinder needles.

A CONTROLLING CAM FOR KNITTING MACHINES

The controlling cam shown at Figs. 1, 2 and 3, has recently been patented in this country. The cam controls the needles in order to open their latches prior to reaching the thread carrier, so that the latches will not strike the carrier and be broken. The cam is designed for circular knitting machines in which the dial is racked or moved around to change the position of the dial needles in relation to the cylinder needles. Fig. 1 is a bottom plan view of the dial cap of the knitting machine; Fig. 2 is a view similar to Fig. 1, with the wing or advancing cam in its innermost position; Fig. 3 is a view similar to Fig. 2 of the ordinary form of dial cap with its cams.

In these drawings, 1 is the dial cap, 2 the stitch cam and 3 the advancing or wing cam, the latter being of different form from the ordinary wing cam for racking; 4 is the thread carrier, and 5 indicates the cylinder needles at the point where they are raised to take the thread.

In racking it is necessary to withdraw the dial needles inwardly so that their outer ends will be wholly within the needle circle of the cylinder needles, and when in this position, the dial may be turned to shift the dial needles in their relation to the cylinder needles, without bringing them in contact with the advanced cylinder needles. To accomplish this the wing or advancing cam, 3, is of the form shown in Figs. 1 and 2, and when shifted inwardly from the position shown in Fig. 1 to that shown in Fig. 2 by any suitable ling connection, such as 5′, controlled by pattern mechanism, the dial needles will re-

main in their retracted position after passing the stitch cam to allow the dial to be shifted or racked around through any suitable mechanism. The needles pass through the cam path in the direction of the arrow, X, the dial cap and thread carried rotating in the direction of the arrow, y.

In the ordinary knitting operation, when a stitch is cast off at the stitch cam, 2, resulting in the stitch being slid over the closed latch of the needle, the latch will sometimes fly open. In a racking machine, in which the dial is turned in relation to the cylinder

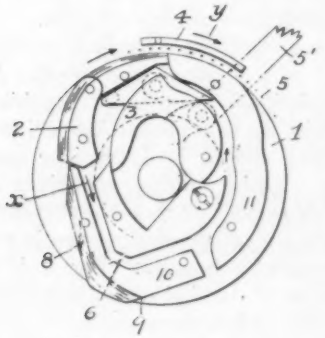


FIG. 1.

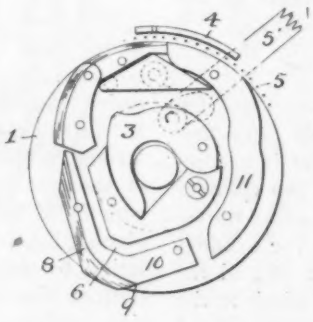


FIG. 2.

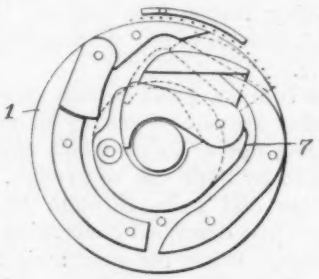


FIG. 3.

while the dial cap does not partake of the racking movement, when these dial needles are advanced again to perform their knitting function, the partly open latches will be in the path of the thread guide and cams of the dial cap and will strike them, resulting in a breakage or bending of the latches and damage to the work and loss of time in replacing the needle or needles.

A special cam, 6, has, therefore, been provided, between the stitch cam and the wing cam, which, immediately after the stitch cam has retracted the needle and cast off the stitch, will advance the needles through the old loops sufficiently to open all the latches and lay them back against the needle stem, but not far enough to get the loops back of the latches. Having done this, the cam will immediately retract the needles to their position for racking to permit them to pass the advanced cylinder needles. The latches will now have been fully opened and be ready to be advanced, when knitting is to be resumed, with their latches thrown back to avoid contact with the thread guide and cams when they come around. This special cam, 6, acts independently of and prior to the arrival of the needle at the wing or advancing cam which, for the racking movement, is adjusted inwardly to the position shown in Fig. 2, and must be of such shape as to leave a clear space for the needles to remain drawn in for the racking action.

In the ordinary dial cap as shown in Fig. 3, 7 indicates the tucking point where the needles are advanced and open their latches before reaching the thread carrier, but this arrangement of cams cannot be used in a machine designed for racking owing to the necessity for allowing the needles to remain at their inward limit at the point where the cylinder needles are advanced. The cam, 6, between the stitch cam and the wing cam serves to advance the needles so as to open the latches and then to retract them for racking, leaving them with their latches open ready to be advanced for resuming knitting without danger of having the latches strike the thread carrier or cams, which occurs should the latches be only partly open.

At the point, 8, the outer cam piece is beveled to allow room for the latch to open. This beveled edge gradually merges at the point, 9, into the flat surface of the cam piece, so that the latch having been opened, will be held by the pieces, 10 and 11. This control of the latch will continue until the needle with its open latch gets under the thread carrier, insuring the maintenance of the latch in its open position.

Dyeing, Bleaching, Finishing, Etc.

PRACTICAL DYEING

BY RENMARK

(Continued from September.)

Conditions vary and the amounts can be very materially decreased, going down to the following quantities: 100 gals. water with 4 lbs. Sulphuric Acid (iron free), and 3 1/2 lbs. Peroxide of Soda. The correct amounts can easily be ascertained by a few experiments.

Instead of sodium peroxide, the hydrogen peroxide can be employed by using 5 gals. hydrogen peroxide, 2 gals ammonia, and 100 gals. water. Leave the material in this solution about four hours at 120° F.

The sulphur bleach is generally spoken of as stoving, and is carried on in a brick or stone chamber, care being taken to have no iron or other metals present, wooden pegs being used in place of nails, as the sulphur would destroy them and make stains on the wool. This chamber is sometimes lined with lead, glass or wood, and the sulphur fumes are produced by burning stick sulphur in an iron pot resting on the floor.

The skeins of yarn, after having been scoured and blued with Methylene Blue, Methyl Violet or indigo, are suspended on wooden sticks and left for five to seven hours to be acted upon by the sulphur fumes. The amount of sulphur necessary is about six pounds for 100 pounds of wool. The chamber is opened and after being well cleared of the sulphur fumes, the yarn is taken out, aired and dried.

Pieces can be bleached according to the same process, except that the bleaching chamber has a different construction, as the pieces run through a slit at one end, then up and down inside the stove over a number of rollers and out again through the same slit by which they entered.

There is still another bleach that is used by some mills. This is the bisulphite of soda bleach, the formula being as follows for 250 lbs. of wool yarn:

1,100 gals. Water.
10 gals. Bisulphite of Soda, 65° Tw.
1 gal. Sulphuric Acid.

Immerse the wool in a cold bath about four hours, or over night, drain and enter into a bath containing 1/2 gallon sulphuric acid to get rid of any bisulphite of soda that may still be in the goods. The goods are worked a few minutes, then washed in water to remove all traces of acid.

EFFECTS OF ACIDS

Dilute acids have no appreciable effect on the wool fiber, but at a boiling temperature are taken up by the wool and retained tenaciously, giving to the fiber an additional "springy" feel. Wool boiled in water has a tendency to lose some of its luster and get weaker, but if the water is acidulated the action is reduced to a minimum. Dilute nitric acid, if applied at a boiling heat, turns the wool yellow, and is used at times to strip color from dyed goods. A solution of 3 per cent. bichromate of potash and 4 per cent. sulphuric acid, at a boil, makes a good stripping agent. It discharges the color, and does not injure the wool fiber materially.

EFFECTS OF ALKALIES

Alkalies in a hot solution have a detrimental effect on the wool fiber, causing it to assume a harsh, undesirable feel. Some of the strong alkalies like caustic soda at a boiling temperature will dissolve the wool completely.

In a cold solution the effect of alkailes is extremely slight. Ammonia and borax are not injurious to wool even at the boil, borax finding use in the dyeing of alkali blues on wool, and ammonia for preventing the color going on the fiber too quickly.

OXIDIZING AGENTS

Permanganate of potash turns wool brown and tenders the fiber if at a boiling temperature, but is not harmful if applied cold, the brown color being easily removable with bisulphite of soda. Wool is some-

times treated with bleaching powder to produce certain effects, the amount used being from 2 to 5 per cent. The result is that the wool obtains a silk like luster and a scroop feel. The fiber becomes yellow, but can be bleached white, and if the harsh scroop feel is not wanted, the fiber can be softened with fatty acids.

Wool can be weighted by being steeped in 10 to 20 per cent. magnesium chloride and 1 to 2 per cent. glycerine, hydro-extracted and dried without washing. The ability of magnesium chloride to absorb and retain moisture is what causes the weighting.

Metallic salts like sodium chloride (common salt) and sodium sulphate (glaubersalt) are without action on the wool fiber, and even when boiled in solutions of these salts wool absorbs only traces.

Aluminum sulphate and bichromate of potash are both used as mordants, being fixed by some acid such as lactic or oxalic, or cream of tartar.

In cold solutions the tannins have no affinity for the wool fiber, but at a boiling temperature the wool absorbs tannic acid, in consequence of which it resists the different dyestuffs. There are several methods in use for "resisting" wool. These will be taken up under wool dyeing.

Of all textile fibers, wool has the greatest affinity for dyestuffs and will absorb the substantive or direct cotton colors in a neutral or weakly acid bath, the basic colors in a cold or lukewarm neutral bath and the acid colors in an acid bath, while the alizarine colors produce very fast shades on mordanted wool. Silk has nearly the same affinity for colors as has wool, but does not retain it so tenaciously, as many of the colors can be washed off of the silk.

(To be continued.)

The estimated value of the cotton crop of 1910, is $963,180,000, compared with $812,090,000 for 1909; $681,230,000 for 1908, and $700,960,000 for 1907.

The average annual production of cotton in the United States for the past five years was 12,175,867 bales, or 170,179 bales more than the crop of 1910.

IMPROVEMENTS IN COTTON BLEACHING

By WALTER S. WILLIAMS, Textile Expert, Arthur D. Little, Inc., Boston, Mass.

Presented before the Congress of Technology.

(Continued from September.)

Steeping may be replaced by a malt treatment, using by preference one of the diastace preparations now on the market. The solution is prepared by using 15 to 20 pounds of diastace or similar product to 100 gallons of water and warming to 140° to 150° F. The goods are wet out in this solution and the action allowed to continue for 15 to 30 minutes, then washed and passed to the next step in the process. Solubility of the starch may also be produced by wetting out with very dilute hydrochloric or sulphuric acid and piling for a short time. This process must be carried out with extreme care, owing to danger of the acid injuring the fiber.

Lime Boil. The cloth is saturated with milk of lime of such a strength that it takes up about 4 per cent. of its weight of CaO, run into one of the standard kiers and boiled with constant circulation of the liquor through the goods. This operation decomposes the fats and similar matter contained in the cloths and forms as a result insoluble lime soaps. These latter are broken up by the scouring which follows and completely removed by the subsequent operations. In addition, the other natural impurities of the raw cotton, as well as starch, are so changed that they either become soluble or are more easily acted upon by the chemicals employed in the succeeding processes.

The grey sours remove the excess of lime and other metallic oxides, if present, besides breaking up the insoluble soaps formed on the fiber.

The lye boils continue the reactions already begun in the lime boil and further saponify and remove any fatty acids resulting from the decomposition of the lime soaps in the previous steps. Resin soap is employed by some bleachers and is supposed to remove certain indefinite constituents of the fiber which are said to have a deleterious effect on the whites of prints and are not fully removed by the other agents employed.

Bleaching or Chemicing. The destruction

of the coloring matter now left in the fabric is the object of this final step. Previous to the nineteenth century this was always accomplished by the exposure of the moist cloth to the action of air and sunlight and extensive bleaching greens formed an important part of every establishment. The use of chlorine for this purpose was first proposed by Berthollet, about 1785, but its use even after the introduction of the hypochlorite of lime was very slow in becoming general. Today, chlorine, either as calcium or sodium hypo, far exceeds all other agents in importance and in amount used. With proper regulation of strength of solutions and duration of action, this bleaching agent may produce the most satisfactory whites without appreciable injurous action on the strength or other desirable properties of the fiber.

Large quantities of chlorine are annually produced electrolytically either as a gas to be absorbed by lime to form ordinary bleach, or as hypochlorite of soda solution to be used direct. On a large scale the latter form cannot compete successfully with the cheaper and more common product, but it finds extensive use in laundries and the small establishments. The sodium hypochlorite solution formed in this form of apparatus contains an excess of sodium chloride which causes the chlorine to be given off freely either to the fabric or the atmosphere. The solutions are therefore unstable and cannot be made in advance. The cost of production is also higher except in the case of cheap electric power and low freight rates for salt.

The much claimed superiority of electrolytic bleach seems to have been based on the increased rate at which the chlorine was given off in the presence of the chloride and may be produced, if desired, in bleach from other sources.

The use of hypochlorite of soda made from bleaching powder and soda ash is highly to be recommended and in many cases will more than repay the increased cost. The following receipt for its maufacture is given by Thies and Herzig:

Two hundred and ninety kilos of bleaching powder of 33 per cent. available chlorine are ground to a paste with 1,100 liters of water, and to this are added 175 kilos of soda ash dissolved in 500 liters of water, and the resulting solution is immediately made up to 2,000 liters. After stirring for one-half hour, the mixture is allowed to settle over night and the clear liquid is decanted. The sediment is mixed with clear water, the clear liquor being decanted and this process repeated until in all 5,000 liters of liquor are obtained, which should stand at from 6° to 6 1/2° Twaddle. This solution is alkaline and is said to keep well.

In order to neutralize the free alkali and start the liberation of the hypochlorous acid, sulphuric or hydrochloric acid is added to the liquor just before using. Thies and Herzig recommend 6 to 7 grams of sulphuric acid of 60° Beaume for every 10 liters of the above bleaching liquor.

The kiers used in bleaching have had much to do with the progress of the art. Starting from open kettles heated by direct fire, the natural tendency led to a large open kier, but heated by steam. A great improvement in this kier was the introduction of a central vomit pipe taking the liquor from the bottom of the kier and throwing it by means of a steam ejector over the goods at the top, thus producing a circulation through the goods. The next improvement was the introduction of the closed kier, by means of which the pressure and consequent temperature of boiling was increased.

The first distinct system was that of Barlow, whose kier was introduced about 1870. This system employs two kiers working in pairs and may use steam up to 40 pounds pressure. The liquor circulates from the bottom of one kier to the top of the other. In working with the Barlow system, both kiers are filled with cloth as usual, the requisite quantity of liquor admitted and steam blown through both to expel the air through vent pipes. The kier is then closed and steam let into one only, so that the pressure at the top forces the through suitable connection to the top of the other, where it is sprayed over the cloth. When most of

the liquor has been forced into the second kier, the valves are changed so that the pressure is led to that kier, changing the circulation to the top of the first kier. This reversing process is continued until the goods are sufficiently boiled, when the kiers are blown out, washed and the process continued as usual.

The next great step in advance was the advent of the Mather kier, which was especially constructed by Messrs. Mather & Platt to carry out the process devised by Horace Hoechlin. In this system the lime boil is entirely dispensed with and this as well as the two lye-boils of the old process are replaced by a single boil in caustic soda and resin soap. The kier used for this boil is a large horizontal cylinder with convexed ends, one of which may be removed to allow the entrance of the goods. Suitable means are provided for raising the door and for making the same steam tight when closed. The pieces to be bleached are piled on wagons made of sheet iron with perforated bottoms and running on tracks leading inside the kiers. When ready the wagons are run into the kier, the door is closed, the air driven out by steam and circulation started. While the kier is boiling, other wagons may be loaded and those already boiled unloaded, thus increasing greatly the production of a single kier.

The process aims to subject the fabric to the action of caustic liquor and steam at the same time and for this purpose the amount of solution used is small compared with the size of the kier. The circulation is maintained by means of a centrifugal pump, which takes the liquor from the space under the wagon and showers it over the top of the goods. It then percolates through the pieces and collects in the bottom of the kier, where it is heated by closed steam pipes and is again taken up by the pump, which maintains a continuous circulation. The kier may also be heated by the introduction of live steam, but the resulting dilutions of the liquor is more objectionable in this than in other kiers.

Several ingenious continuous processes have been proposed for boiling cotton piece goods, but as yet no system of this character has succeeded in prolonging the treatment long enough to produce results comparable with those obtained by the more usual method.

The Thies kier and the process of which it forms a part are the result of long, careful research by Thies and Herzig. By designing the kier in such a manner that no steam comes in direct contact with the liquor and thus avoiding the action due to the oxygen contained in the air always present in steam, it is impossible to use strong caustic at a high pressure without fear of tendering the fabric. The latest form of kier consists of three parts,—the kier proper, the vacuum boiler and the superheater. The vacuum boiler consists of an upright cylindrical vessel similar in size and shape to an ordinary kier, while the superheater is of the same height as the kier, but much smaller in diameter. The latter is provided with closed coils for heating. For the circulation and transfer of liquors, use is made of a Grindle pump. The boiling consists of two parts and the process is described by the authors as follows:

The goods saturated with alkali (liquor blown off from the previous bowking) are packed into the kier and then by means of the Grindle pump, the old kier liquor is drawn from the vacuum boiler (which is quite full to start with, and closed at the top) and sent in at the bottom of the kier until the latter is quite full, the air escaping through a blow-off valve at the top. As soon as the kier is full, the air valve is closed. By pumping the liquor from the vacuum boiler into the kier, a vacuum equal to about 10 pounds is produced in the former vessel. A pipe provided with a throttle valve connects the top of the kier with the top of the vacuum boiler.

This valve is now slightly opened, so that a circulation of the liquor takes place, while any air contained in the kier rises with the liquor, passes through the throttle valve into the vacuum boiler, where the liquor falls to the bottom and expands into the vacuum.

The pressure in the kier is now gradually increased to three atmospheres by choking the valve, when any air remaining in the goods is mechanically dissolved out of the goods (air being more soluble in water under pressure) and transferred to the vacuum boiler. After the air in the vacuum boiler has been expelled, steam is turned on in the superheater and the bowking continued for 2 hours at 45 pounds pressure.

The pump is now stopped, the steam turned off and the liquor blown off under its own pressure. Fresh lye, consisting of caustic soda at 6° to 7 1/2° Twaddle and the resin soap, is now run into the kier (which is free from air) the pump set in motion again, steam turned on in the superheater and the bowking proper continued for 6 hours at 45 pounds pressure.

As free hypochlorous acid is much more efficient as a bleaching agent than any of its salts, we find many attempts to make use of this property. Mather and Thompson pass the cloth continuously through closed chambers in which the pieces are run through an atmosphere of Co2 after being saturated with the ordinary bleaching solution. Acetic acid vapors have also been used in the same manner. The addition of small amounts of sulphuric or hypochlorice acid or of acetic or formic acid to the chemic solution will produce similar results, and the improved action of the liquors will be at once apparent.

Chlorine in cotton bleaching may be replaced by other oxidizing agents and will no doubt be superseded at some later date by some agent acting less injuriously on the fiber itself. Such a body is found in sodium or hydrogen peroxides and it is only the higher cost which prevents its more general use. For cotton and silk goods, laces and other special fabrics, it finds extensive application.

Drawing freely from all published information, especially the results of the researches of Koechlin, Thies and Scheurer, the following process has been evolved as a working compromise of the theoretical and practical. The goods are marked and sewed as usual and piled on trucks. They are then run through the gas singer and directly through a lukewarm solution of diastafor and into a continuous piling chute.

(To be continued.)

THE CONTINUOUS PROCESS OF EXTRACTING AND DYEING WOOL GOODS

BY JOHN D. STREET

The continuous process scheme, so widely and successfully adopted by cotton finishers, is attracting the attention of its kindred industry, i. e., woolen and worsted finishers. A larger daily production requires newer methods of handling than formerly used. The caprice of fashion which calls for a greater variety of shades means a great deal more extra care in turning out perfect goods. Then we must remember that the finish sells the fabric, hence the necessity of keeping the last end of the manufacture in up-to-date conditions.

Heretofore the almost general practice has been that after the goods have been fulled, two or more pieces are coiled in the centrifugal extractor. Following this operation, it is necessary that the goods be opened up by hand or over the mechanical scutcher.

This extracting in rope form presents several serious disadvantages. In the first place, valuable time is lost loading and unloading the basket. A more serious trouble is that, as the extractor rotates, the water is forced through the different thicknesses of the material from the center to the outside or perforated cage. More or less water is sure to remain in the twist of the fabric. This statement can be easily verified by whizzing the usual length of time until no water appears at the outlet, then unload the basket, open up the material and replace it in the extractor. It is surprising how much more water can be extracted by this second operation. This proves that after one regular extracting some parts of the material will still remain very wet. Should the fabric be taken in this condition to the tenter, it stands to reason that the speed of the dryer will be governed by the drying out of the wettest part. If the cost for labor and steam

used in the tenter coils is taken into consideration, then a better way of extracting the moisture should be devised and installed.

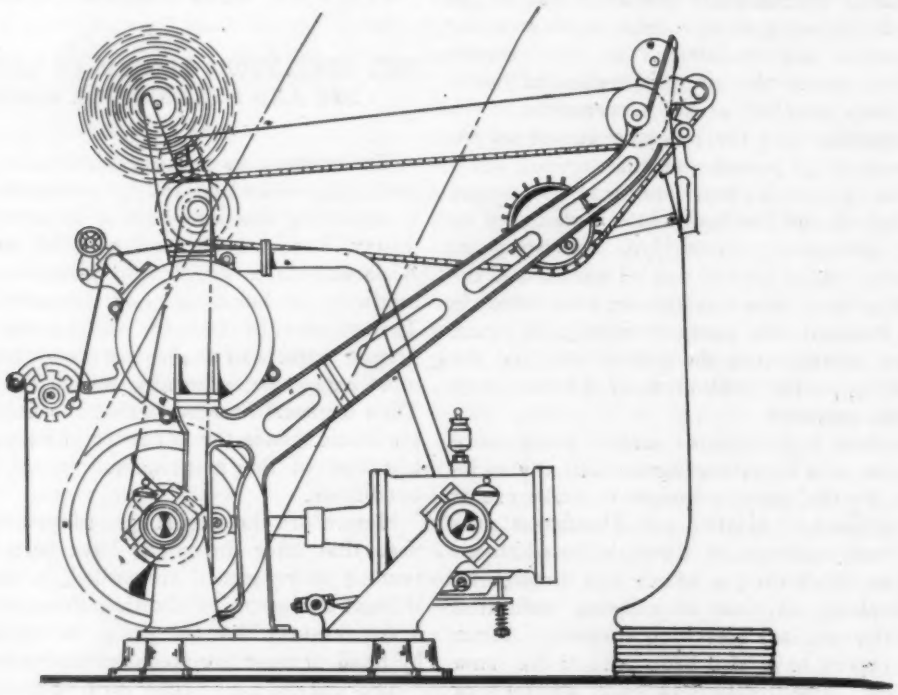


FIG. 1.

Another bad feature of the centrifugal extracting is that the nap of the fabric is badly ruffled, often necessitating a special gigging.

load into the basket—then open up—and prepare for the tenter? A few years ago an American woolen finisher adopted the principle of suction boxes, as used by the paper manufacturers, for the extraction of the surplus water from the pulp. Theoretically, the

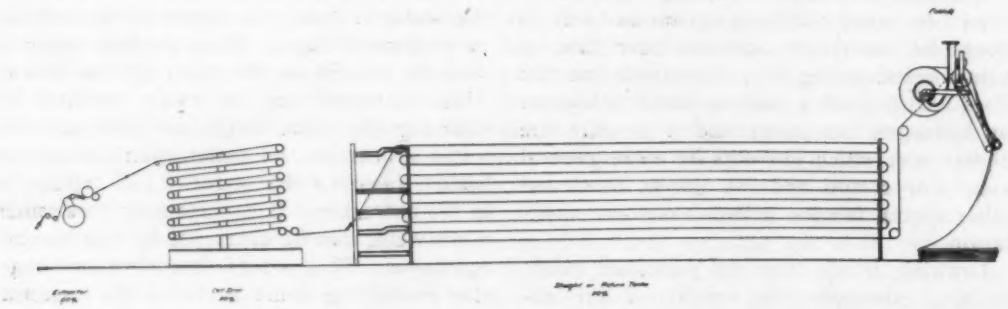


FIG. 2.

Assuming that the open width crabbing machine is already installed, would it not appear to be a waste of time and money to break off at each two or three pieces and

principle was sound. While American manufacturers were slow at catching on, the foreigner did not hesitate to take up the idea and install these open width extractors for

the finish of their goods. By so doing they cut out one-half of the handling and the usual damages attending to it, such as ruffling of the nap and more or less staining on the light colored fabrics.

The open width suction extractor, as shown at Fig. 1, occupies but a small amount of floor space. It consists principally of a cylindrical suction box, with a slit lengthwise of the top, over which the fabric is drawn by a pair of nip rolls. The vacuum is formed in a lower cylinder from which the water is expelled. A pump to create the vacuum is part of the machine. This extractor we are told is suitable for all weights of fabrics. The step cone drive permits a perfect control. The open width is especially recommended for carbonized fabrics, as it permits a thorough extraction from end to end.

From the extractor, the fabric, still containing about 40 per cent. of moisture, can be guided continuously to the tenter machine, but practice has demonstrated that 20 per cent. of moisture is ample to permit the pulling out to width, hence the advisabiity of an intermediate drier to evaporate the 20 per cent. of unnecessary moisture. This can be installed between the extractor and the tenter. In the finishing of cotton fabrics steam cylinders are in general use. They would be equally available in woolen and worsted mills, were it not that the drying out is first on the face, then on the back from cylinder to cylinder. This has a tendency of keeping the evaporated vapor coming and going, thereby losing much of its efficiency. The newest arrangement is a single stack of cell driers, which permits the evaporation from one side only. As the back of the fabric is drawn over the steam heated cells the vapor arises from the face, leaving the material in a more mellow condition. As the tenter will only have 20 per cent. of moisture to evaporate, it can be speeded up to three times the old yardage, or in any case as fast as the operatives can pin. The range, as shown in Fig. 2, means economy of steam, labor, floor space and investment in machinery.

Dye Recipes

The following recipes appear in the Dyers' Supplement, which is issued each month by the TEXTILE WORLD RECORD. The Supplement contains the colored samples, dyed according to recipes given. The selection of samples is carefully made, and it is the aim to show shades which are of especial interest to the dyer, and which the requirements of the market demand. The Dyers' Supplement is a 16-page pamphlet, in convenient form for preservation. Subscription price for the Dyers' Supplement $1.00 per year.

Recipe No. 145

BLUISH SLATE ON SLUBBING

Sulphazine Blue G R Extra on 100 lbs. slubbing. Mordant first with

3 lbs. Chrome.
3 lbs. Half Refined Tartar C.

Enter stock lukewarm, bring to a boil in 1/2 hour, and boil 1 1/2 hours. Rinse thoroughly. In dyeing use

½ lb. Sulphazine Blue G R Extra.
(American Dyewood Co., 84 William St., N. Y.)

Enter stock lukewarm, raise slowly to a boil in 1/2 hour, and boil 1 1/4 hours.

Sulphazine Blue G R Extra dyes level and produces on slubbing and wool bright bluish slates of eminent fastness to light and hard fulling.

Recipe No. 146

BLUE ON WORSTED YARN

Xylene Blue B S on 100 lbs. worsted yarn. Prepare the dye bath with

3 lbs. Xylene Blue B S.
(W. F. Sykes & Co., 85 Water St., N. Y.)
10 lbs. Glauber's Salt.
4 lbs. Sulphuric Acid.

Enter at 160° F., and dye at a boil for one hour.

Xylene Blue B S is especially recommended for its level dyeing properties, and its fastness to light and washing.

Recipe No. 147

SCARLET ON WORSTED YARN

Fast Ponceau L on 100 lbs. worsted yarn. Prepare the dye bath with

3 lbs. Fast Ponceau L.
(Farbenfabriken Co., 117 Hudson St., N. Y.)
15 lbs. Glauber's Salt.
4 lbs. Sulphuric Acid.

Enter at 160° F., and bring slowly to a boil, and dye at a boil for one hour.

Fast Ponceau L possesses very good fastness to light, and will be found an excellent scarlet for all ordinary purposes.

Recipe No. 148

GREEN ON WORSTED YARN

Guinea Green 2 G on 100 lbs. worsted yarn. Prepare the dye bath with

3 lbs. Guinea Green 2 G.
(Berlin Aniline Works, 213 Water St., N. Y.)
4 lbs. Sulphuric Acid.
15 lbs. Glauber's Salt.

Enter at 160° F., and dye at a boil for one hour.

Guinea Green 2 G produces a desirable and bright shade of green possessing the characteristic properties of the acid dyes.

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Recipe No. 149

BLUE ON SLUBBING

Sulphazine Blue G R Extra on 100 lbs. slubbing. Mordant first with

3 lbs. Chrome.
3 lbs. Half Refined Tartar C.

Enter stock lukewarm, bring to a boil in 1/2 hour and boil 1 1/2 hours. Rinse thoroughly. In dyeing use

2 lbs. Sulphazine Blue G R Extra.
(American Dyewood Co., 84 William St., N. Y.)

Enter stock lukewarm, raise slowly to a boil in 1/2 hour, and boil 1 1/4 hours.

Sulphazine Blue G R Extra dyes level and gives on slubbing and wool handsome shades of blue of eminent fastness to light and hard fulling.

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Recipe No. 150

ORANGE ON COTTON YARN

Diamine Azo Orange R R on 100 lbs. cotton yarn. Prepare the dye bath with

3 lbs. Diamine Azo Orange R R.
(Cassella Color Co., 182 Front St., N. Y.)
½ lb. Soda Ash.
25 lbs. Common Salt.

Diamine Azo Orange R R gives an excellent shade of orange possessing very good fastness for a direct cotton color.

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Recipe No. 151

BROWN ON WORSTED YARN

Salicine Chrome Brown K on 100 lbs. worsted yarn. Prepare the dye bath with

3¾ lbs. Salicine Chrome Brown K.
(Kalle & Co., 530 Canal St., N. Y.)
20 lbs. Acetic Acid.

Enter at 100° F., bring slowly to a boil, and boil for one hour. Then enter in a fresh bath at ordinary temperature, made up with

1½ lbs. Potassium Bichromate.
10 lbs. Acetic Acid.

Bring to a boil, and boil for 3/4 of an hour. Then rinse in lukewarm water.

Salicine Chrome Brown K possesses excellent fastness to light and weather, washing, and fulling, and also possesses very good fastness in other respects.

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Recipe No. 152

BRIGHT BLUE ON COTTON YARN

Azerole Brilliant Blue 6 B on 100 lbs. cotton yarn. Prepare the dye bath with

2 lbs. Azerole Brilliant Blue 6 B.
(Innis, Speiden & Co., 46 Cliff St., N. Y.)
20 lbs. Common Salt.

Enter at 160° F., bring to a boil, and dye at a boil for one hour.

Azerole Brilliant Blue 6 B produces an extremely brilliant shade of blue for a direct cotton color.

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Recipe No. 153

BLUE ON WORSTED YARN

Alizarine Blue S R on 100 lbs. worsted yarn. Prepare the dye bath with

4 lbs. Alizarine Blue S R.
(C. Bischoff & Co., 451 Wash. St., N. Y.)
5 lbs. Acetic Acid.
10 lbs. Glauber's Salt.

Enter at 120° F., bring slowly to a boil, and dye at a boil for one hour. Then add

1½ lbs. Potassium Bichromate,

and continue the boiling for one hour.

Alizarine Blue S R is extremely fast to light and fulling, penetrates well, and dyes very level.

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Recipe No. 154

PINK ON COTTON YARN

Helindone Pink A N on 100 lbs. cotton yarn. Prepare the stock liquor with

4 lbs. Helindone Pink A N.
(H. A. Metz & Co., 122 Hudson St., N. Y.)
12 gals. Hot Water,

to which has been added

6 lbs. Caustic Soda Solution, 40° Be..
3 lbs. Helindoil.

To this mixture slowly add

1½ lbs. Hydrosulphite M L B Conc. Powder.

This solution should be well stirred, and then allowed to stand for 20 minutes. The temperature should not rise above 140° to 160° F. Complete reduction will be shown by its brownish color.

The dye bath should be prepared with the necessary amount of water, to which has been added

2 ozs. Hydrosulphite M L B Conc. Powder.
4 ozs. Caustic Soda Solution, 40° Be.

Dye for 1/2 hour at a temperature of 120° F., then allow to oxidize in the air for 15 minutes. Then soap for 1/2 hour at a boil in a solution made up with two parts soap per 1,000 parts water.

Helindone Pink A N possesses remarkable fastness to alkali, washing, and chlorine bleach, and is recommended where these qualities are essential.

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Recipe No. 155

BLUE ON WORSTED YARN

Ethyl Acid Blue R R on 100 lbs. worsted yarn. Prepare the dye bath with

4 lbs. Ethyl Acid Blue R R.
(Badische Co., 86 Federal St., Boston.)
20 lbs. Glauber's Salt.
3 lbs. Sulphuric Acid.

Enter at 120° F., and dye at a boil for one hour.

Ethyl Acid Blue R R is especially adapted for the dyeing of woolen piece goods. This color possesses good fastness to light, stoving, carbonizing and rubbing.

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Recipe No. 156

RED ON COTTON YARN

Fast Acid Red R H on 100 lbs. cotton yarn. Prepare the dye bath with

5 lbs. Acetic Acid.
½ lb. Fast Acid Red R H.
(Read Holliday & Sons, 11 Gold St., N. Y.)

This color may be applied direct in an acid bath on a chrome mordant, or by the top-chrome process. Applied by any of these methods it is excellent to light and fast to milling. It may be applied with acetic, formic or sulphuric acid. It is excellent for carpets, tapestries and mohair articles, ladies' dress goods, etc.

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Recipe No. 157

BROWN ON COTTON YARN

Direct Brown Y on 100 lbs. cotton yarn. Prepare the dye bath with

2 lbs. Direct Brown Y.
(E. M. Thayer & Co., 411 Atlantic Ave., Boston.)
20 lbs. Common Salt.

Dye at a boil for one hour.

Direct Brown Y possesses the usual properties of the substantive colors and is particularly useful for yellowish brown shades. It dyes very level, goes on slowly, and works well with all substantive colors.

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Recipe No. 158

OLIVE GREEN ON WORSTED YARN

Anthracyl Chrome Green D 739 on 100 lbs. worsted yarn. Prepare the dye bath with

3 lbs. Anthracyl Chrome Green D 739.
(F. E. Atteaux & Co., 174 Purchase St., Boston.)
10 lbs. Glauber's Salt.
6 lbs. Acetic Acid.

Enter at 120° F., bring slowly to a boil, and after boiling 3/4 of an hour, add

1 lb. Sulphuric Acid,

and continue the boiling until the bath is exhausted. Then after-treat in a bath made up with

3 lbs. Potassium Bichromate

at a boil for one hour.

Anthracyl Chrome Green D 739 possesses the excellent fastness of the after-chromed colors, and will be found of great value in the dyeing of compound shades.

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Recipe No. 159

RED ON COTTON YARN

Fast Acid Red R H on 100 lbs. cotton yarn.

5 lbs. Acetic Acid.
3 lbs. Fast Acid Red R H.
(Read Holliday & Sons, 11 Gold St., N. Y.)

This color may be applied direct in an acid bath on a chrome mordant, or by the top-chrome process. Applied by any of these methods, it is excellent to light and fast to milling. It may be applied with acetic, formic or sulphuric acid. It is excellent for carpets, tapestries, and mohair articles, ladies' dress goods, hosiery yarns, and all goods which are subjected to hard weathering.

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Recipe No. 160

BLACK ON WORSTED YARN

Oxy Chrome Black F on 100 lbs. worsted yarn. Prepare the dye bath with

7 lbs. Oxy Chrome Black F.
(Geisenheimer & Co., 189 Front St., N. Y.)
10 lbs. Glauber's Salt.
3 lbs. Acetic Acid.

Enter material at 120° F., or lower. Raise slowly to a boil during 1/2 hour, and boil for 3/4 of an hour, thoroughly exhausting the dye bath towards the end by the addition of

1½ lbs. Sulphuric Acid.

Then add

1¾ lbs. Potassium Bichromate,

and boil 3/4 of an hour longer.

It is well to cool the bath somewhat before adding the bichromate, and then bring slowly to the boil again.

Oxy Chrome Black F possesses excellent fastness to light and washing.

New Machinery and Processes

This department is designed to present from month to month a brief mention of new machinery, devices and processes being brought out in this country and abroad, that are of interest to the textile manufacturers. It is not a list of patents but of improvements on the market, the idea being to present to our readers a systematic monthly record of new machinery, etc., of interest to textile mill men.

Whenever possible we endeavor to make a personal investigation of the new machinery and processes described in this department. In the absence of such personal investigation we must necessarily rely upon information obtained from those who control the machines and processes.

We invite machine builders and others to send us such information for this department.

Two-Thread Looping Device. John W. Hepworth & Co., Lehigh Ave. and Mascher St., Philadelphia, Pa. A two-thread elastic lock stitch attachment adapted for being applied to the Hepworth single stitch loopers.

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Substitute for Lug Strap. Whitney & Crockett, 184 Summer St., Boston, Mass., are placing on the market a device taking the place of lug straps on looms. A description appears in this issue.

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Thread Drawing Machine. The Fischer Thread Drawing Machine Co., 203 Church St., New York. A machine for drawing the threads from woven goods and which does the work previously done by hand.

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Cutters for Knit Goods. The Artos Engineering Co., 286 Lake St., Milwaukee, Wis., are placing on the market an improved line of cutters for knit goods. A description will be found in this issue.

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Doffing Device for Ring Spinning Frames. Howard & Bullough American Machine Co., Pawtucket, R. I. The object of this device is to push and hold back automatically all the ends during the operation of doffing. This is designed to save the doffers' time and also reduce the breakage of ends on account of their being entirely out of the doffers' way. It is also claimed to do away with many badly wound bobbins, that is, bobbins wound on by hand by the doffers and which later on cause waste and breakage at the spoolers. The device is the invention of P. J. Hinds and Edgar Ferris and we understand it is now being successfully used at a number of mills in New Bedford, Fall River and Holyoke.

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Permanent Finish. F. A. Bernhardt, Zittau, Germany. A process for making permanent the luster finish obtained by pressing cloth between finely corrugated rollers.

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Spinning Kapok. Emil Stark, Chemnitz, Germany. A process for preparing kapok and similar fibers for spinning. It is claimed that excellent results have been obtained with this process.

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Velvet Cross-Brushing Machine. J. Renshaw & Co., Manchester, England. An improved rotary cross-brushing machine for velvets and corduroys.

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Dust Removing Apparatus. The Whitfield Fan Co., Ltd., Shipley, England, have recently brought out an improved system of removing dust from cotton cards.

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Press for Knit Goods. John Davis & Son, Ltd., Derby, England. An improved rotary press for knit goods which has a record of six hundred garments per day.

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Moistening Yarn. Harzer & Co., London, E. C., England. A machine for adding water to yarn in order to increase the weight. The moisture is distributed uniformly through the yarn by means of a forced draft of air.

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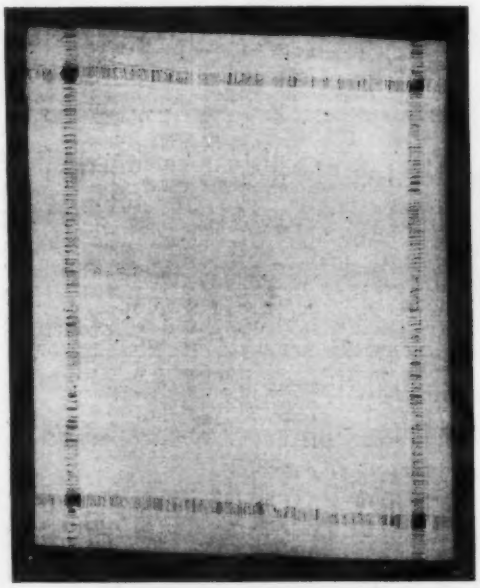
Indigo Dyeing Machine. Planella & Co., Barcelona, Spain. A machine for dyeing indigo blue on skein yarn.

THE FISCHER THREAD DRAWING MACHINE

This machine, which is built by the Fischer Thread Drawing Machine Co., 206 Centre St., New York, is used for removing either warp or filling threads from woven goods. A sample of the work done with the Fischer machine is shown in the accompanying illustration. Heretofore the removal of threads from woven goods has been carried on by a slow and expensive hand process. The physical and mental strain on the operative was so great as to interfere seriously with



A SAMPLE OF THE WORK DONE ON THE FISCHER THREAD DRAWING MACHINE.

the production and much loss has been suffered by manufacturers owing to the inability to provide a sufficient quantity of hand drawn work. The Fischer machine which supplants this hand labor is not an experiment. A number of the machines have been in successful operation in New York for a considerable time. By careful comparison under factory conditions one Fischer machine has been found to be capable of doing the work of 25 hand operatives. An inexperienced girl can operate the machine. The Fischer Thread Drawing Machine Co. state that the wages of seven to ten operatives, amounting to at least $2,000 per annum, can be saved by each machine. Figure the saving in space, labor and spoiled work, and it will be seen why high grade hem-stitched work can now be offered to the public at prices to suit all purses. The builders state that manufacturers are not asked to consider this machine because it is better than the one they are now using. Nothing has to go to the waste heap to make room for this. It is revolutionary and supplants only hand labor.

The following is a sample of a number of letters received by the Fischer Thread Drawing Machine Co. from users of their machine:

> Replying to your inquiry as to whether there is any other machine for drawing threads like the one we have, would say that it is the only machine of any kind, class or description, that I have ever seen or heard of. I will go still farther by stating positively that nothing of this kind has been attempted before. The only method in use, previous to the adoption of this machine, was the old fashioned and tedious method of drawing by hand.
>
> Replying to your request for information regarding capacity, etc., of thread drawing machines we have here, would say they are doing from three to ten times the amount possible by hand, according to the grade and fineness of the material. . . .

The operation of the machine is described as follows:

A vertically acting needle bar carries a long needle somewhat diamond shaped in section, with very fine teeth or barbs on one of its lateral edges, all other edges and faces being finished extremely smooth. A cutter below the bed plate of the machine, operating from a horizontal shaft, together with standard feed blocks and foot comprise the other essential parts.

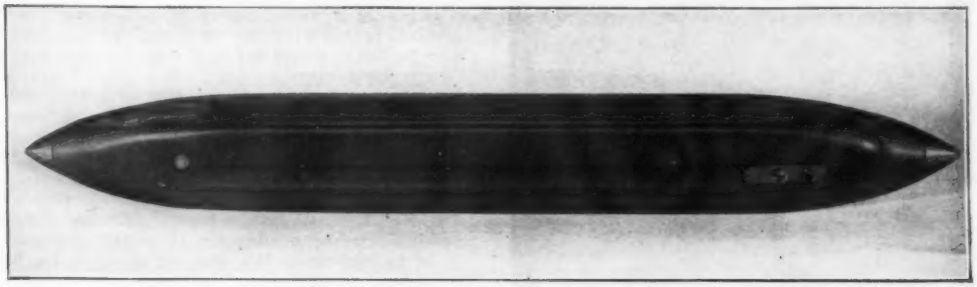
On the downward stroke of the needle, the cross threads (from the position of the operator) are separated, owing to the above mentioned needle section, while the vertical threads, left exposed to the barbs or teeth on the needle, are cut and forced down below the under surface of the work. As the needle bar then rises, drawing the needle clear of the work, the rotary cutter flashes by, snipping off the loose thread ends. This operation, repeated with great rapidity, and

with varying amount of feed between strokes, according to the texture of the fabrics under work, produces an absolutely uniform result, in which all the threads in one direction are removed, while in the opposite direction they remain undisturbed.

Further information in regard to this labor-saving machine can be obtained from the builders.

A NEW HAND-THREADING SHUTTLE

The illustration shows the new hand-threading shuttle manufactured by the American Textile Specialty Machinery Co., 670 Eddy St., Providence, R. I., and which has been introduced into a number of New England mills with the most satisfactory results. It will handle any size yarn from the finest silk to the coarsest carpet filling, something that the manufacturers claim has not heretofore been possible. Among the other claims made for this shuttle is that it will not unthread when the yarn "balloons." A hole is bored through the bottom of this shuttle in order to enable any lint that might accumulate to be removed. There is plenty of room in the shuttle for inserting felt to provide tension on the yarn. An application for patent has been made.



A NEW HAND-THREADING SHUTTLE.

This shuttle is of special interest to manufacturers at the present time owing to the law recently enacted in Massachusetts forbidding the use of the old style shuttles with which the yarn was sucked through, causing the spread of disease. This law has met with general favor throughout the textile world and it is believed that the example of Massachusetts will be followed by other states and countries.

THE LEIMAN PRESSURE BLOWERS

The pressure blowers built by Leiman Bros., 62 John St., New York, are recommended for their high efficiency and the simplicity of their construction, the latter feature being shown clearly in the accompanying illustration. The entire working parts consist of only the piston and four wings. The wings are attached to the piston by a hinge-like device producing a very easy action, and by the rotating motion of the machine they are kept in constant contact with the inner cylinder wall. Each wing as it reaches the top is kept close to the inner cylinder wall by a pressure stud, thus preventing the air from passing back into the machine, thereby insuring a perfect compression at all times.

The advantage gained by this simple construction is, that the wings in constant operation will wear in conformity with the inner cylinder wall and maintain a perfect fit and positive air pressure, even after long continued usage. On the largest size the wings being necessarily larger and heavier are provided with a steel guide on which the wings rest on the outward motion, which counterbalances the weight of the wing and produces a smooth, easy action. There are no delicate parts of these machines to get out of order. All parts are massive in construction and built to stand wear and strain. The operation of the machine depends upon natural forces without the aid of springs, tips on the wings made of foreign material to require constant renewing, etc., while all parts are interchangeable.

Probably the most important consideration in selecting a blower is the question as

to how long it will last, or its ability to maintain its rated pressure and efficiency after long continued use. The interior construction of the Leiman blowers is such that the wings take up their own wear. They are al-

THE LEIMAN PRESSURE BLOWER.

ways in perfect contact with the cylinder however old the machine may be. This results in the highest efficiency even after long continual use. The curved form of the wing, together with the small size of the piston increases the size of the air chamber and consequently the capacity of the blower.

These blowers are in extensive use for a great variety of purposes, among which may be mentioned the following: Melting of metals, hardening, annealing, tempering, forging, brazing, soldering, cleaning, agitating liquids, sand blasting, fuel oil plants, laundries, tailoring shops, carpet cleaning, glass blowing and bending, organ blowing, removing paint, atomizing, heating and ventilating, pneumatic service, testing gas fixtures, burning brands and vacuum cleaning.

Leiman Bros. also manufacture a line of vacuum pumps and would be pleased to give information regarding their products to anyone interested.

THE METALLIC ANTI-LUG STRAP

The device shown in the accompanying illustrations take the place of lug straps on a loom. It has been subjected to a thorough test with the most satisfactory results on both cotton and woolen looms. All parts are metal except the wooden piece. The wearing part consists of a steel ball and socket inside the cup shaped part that is shown in the illustrations. The ball is of steel and the socket of phosphor bronze, as a result of which the joint is able to stand continuous wear for years, a guarantee of three years being given by the manufacturers, Whitney & Crockett, 184 Summer St., Boston, Mass. Fig. 1 shows the device used on a broad loom; Fig. 2 shows the cotton loom type.

FIG. 1. THE DEVICE USED ON THE BROAD LOOM.

The advantages claimed for this device are the elimination of all leather lug straps and power straps, the prevention of lost motion and the avoidance of screws and screw holes.

The device is fastened to the picker stick by means of the right and left hand screw, shown at the left of each illustration. It serves to strengthen the picker stick and when a readjustment is required the device is loosened by the screw, placed in the desired position and then tightened up, the

FIG. 2. THE COTTON LOOM TYPE.

operation requiring but a very short time. This attachment will be appreciated by manufacturers and loom fixers who have long had to contend with the ordinary lug straps.

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The export of linen piece goods from the United Kingdom for the five moths ending May, 1911, amounted to 85,134,100 yards, valued at $11,696,044, a decrease of 17,193,100 yards valued at $1,482,949, for the same period of 1910. The decrease to the United States alone was 17,001,800 yards, valued at $1,771,279.

The average of cotton seed for the crop of 1910 is $27.40 per ton, compared with $27.70 for 1909.

INDUSTRIAL LIGHTING EQUIPMENT

While the past types of Holophane-D'Olier steel reflectors practically solved the industrial lighting problem by providing units of extremely high efficiency and wide applicability, there are certain conditions where those reflectors with their aluminum finish are unsuitable on account of deterioration due to acid fumes or excessive dirt or exposure. It was with a view to meeting adverse conditions that the Holophane Company perfected a new line of steel reflectors having a tough enamel finish and with the holders and connections of copper.

These new reflectors here illustrated are finished both inside and out with a white enamel, which has reflecting value about 18 per cent. higher than any other at present available. This enamel is not affected by chemical fumes or by weather conditions and is very easily cleaned, which means that there is no corroding or other deterioration. They are furnished with the extensive type of light distribution only.

Three holding devices are now available for use with Holophane-D'Olier reflectors. The clip spring holder is well known, being the type that has hitherto been supplied exclusively; a new 2 1/4-inch heel which admits using the steel reflectors with standard holders, and a porcelain socket holder which allows the use of steel reflectors in many installations where brass sockets are not permissible, are now supplied also. These holders as before stated are copper finished and are of a sturdier construction than those heretofore used.

A TYPE OF HOLOPHANE-D'OLIER REFLECTOR.

The Holophane Company has just issued a very attractive leaflet covering its new enameled reflectors, in which complete data is given.

NEW AMERICAN CUPRA-AMMONIUM PROCESS OF MAKING ARTIFICIAL SILK

There are three distinct processes by which artificial silk is manufactured in Europe.

1. The Gun Cotton (Chardonnet) Process.
2. The Viscose Process.
3. The Cupra-Ammonium Cold Process.

In the gun cotton (Chardonnet) process the cellulose is treated with nitric and sulphuric acids; which form a nitrocellulose.

This nitrocellulose is then dissolved in alcohol and ether forming collodion of high density.

This collodion is pressed through spinning discs. Meantime the alcohol and ether rapidly evaporating, the nitrocellulose coagulates (reforms) in the nature of a fine thread, the degree of fineness being determined by the size of the opening in the spinning disc through which the collodion is pressed.

The principal disadvantages of this process are that the product is extremely difficult to handle, it is highly inflammable and explosive and the necessary process of denitration is an expensive one and the fiber is weakened.

The Viscose Process consists of treating the cellulose with caustic soda, thereby forming a cellulose salt.

This salt is then dissolved by contact with bisulphate of carbon, the result forming the syrupy substance. This syrup is brought into contact with ammonia sulphate, which causes the cellulose to coagulate in a manner from which it can be spun into a fine thread, the waste chemicals being removed by washing.

The viscose process is less costly than the gun cotton process, but still presents many technical difficulties, and the chemicals decompose the cellulose so that there is great waste, also the temperature has to be very exact.

The Cupra-Ammonium Cold Process. Some few years ago, scientists discovered that cupra-ammonium would, under certain conditions, dissolve cellulose. This new process dispensed with the necessity for the conversion to and reconversion from nitrocellulose, which of course eliminated a big labor and chemical cost. But even this process was and is carried out under a great handicap.

It has to be operated in a temperature not exceeding 36° Fahrenheit, almost freezing point. So that even the saving in labor and chemicals was nearly all eaten up by the cost of refrigerating the plant, and the acute climatic conditions under which the workers were forced to labor.

Two years ago, several American scientists, headed by Henry Bernstein (an authority on silk, who has given much attention to the manufacture of artificial silk) began experiments to produce silk by the Cupra-Ammonium process and at the same time, do away with the necessity of working at a temperature of 36° Fahrenheit. At the same time they sought to discover chemicals that

could be recovered and reused, and which would strengthen the silken fiber and render it immune to the effects of dampness.

They estimated that the nearer one could approximate the method of the silk worm, the more perfect would be the ultimate result.

The silk worm accumulates a coagulated precipitation of silk in its two spinning glands placed directly beneath the mouth. From these glands, a fine filament is pressed outwards and becomes solidified by contact with the air. This raw silk filament takes the form of a double thread, consisting of two cylindrical threads of an approximate thickness of 0.02 m/m—200th of a milimeter. The inventive faculty of man has been bent to reproduce this natural method of silk making, so that the coagulated substance could be reproduced and the filaments solidified by the action of the air, could be spun into threads of the length and fineness of the genuine silk thread.

The process discovered by Mr. Bernstein and his associates reproduces the natural action of the silk worm as closely as nature, chemistry and human ingenuity will allow. It is claimed there is absolutely no danger in manipulating the chemicals; that the method is virtually non-inflammable and non-explosive as compared with the "Gun Cotton" process; that denitration is eliminated entirely, and there is no waste of highly expensive chemicals, in fact all the chemicals are recovered and reused, representing a great saving in labor and chemical cost alone.

Yarn made by this process has been used with satisfaction in Philadelphia by silk piece-goods weavers, broad goods weavers of silk and cotton, ribbon weavers, makers of table covers, manufacturers of ladies' belts, laces and embroideries, manufacturers of plush goods, upholsterers, trimmings, silk braids, etc. It seems to be very well adapted for cross-dyeing and possesses strength and resiliency.

The American Artificial Silk Mfg. Co. has been formed and has secured a large tract of land in Camden, N. J., for the purpose of building and equipping a factory to manufacture yarn by this process. The officers of the new corporation are men for the most part connected with the silk industry, the president being John Bister, who is president of the Rogers, Thompson, Givernaud & Co. silk mills; Henry Bernstein is vice-president and head of the firm of Bernstein, Kaufman & Co., Philadelphia, manufacturers of silk braids, millinery and dress trimmings; the secretary and treasurer is V. F. Wilcox, of Russell, Murray & Co., New York, silk importers, and a director of the Singleton Silk Mfg. Co.; W. P. Covell, connected with the Pierce Mfg. Co. of New Bedford; W. B. Hawes, of O. S. Hawes & Bro., cotton yarn dealers, of Fall River; several financial men are also on the board. This American artificial silk industry will be watched with great interest by the silk trade and textile manufacturers generally.

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MILL NEWS

New Jersey, South River. The Middlesex Embroidery Works have been reported incorporated by Walter Seenhauer, of South River, and Arthur Schoenbrun, of New York. The concern is capitalized at $50,000.

New Jersey, West New York. The Princess Embroidery Works have been incorporated with a capital stock of $125,000 to manufacture and deal in all kinds of embroidery, laces, cotton, linen, silk, wool and other fabrics. The incorporators are Solomon Littauer, 314 Columbia St., Union, N. J.; David Perlstein, 266 Palisade Ave., Union, and Morris Littauer, 218 Columbia St., Union.

New York, Amsterdam. At a recent meeting of the stockholders of the Consolidated Woolen Felt Mills Co., of which Chas. J. Webb & Co., of Philadelphia, were the chief stockholders, adopted a recommendation for the dissolution of the corporation. The plant formerly occupied by the company at W. Main and Henrietta Sts. was destroyed by fire some time ago. The company has decided not to rebuild and will dispose of the property. John Stansfield was the president of the company up to the time of its dissolution.

New York, Brooklyn. It is reported that involuntary bankruptcy proceedings have been instituted against the Fain Mill, 902 Park Ave., on petition of S. Klausner & Son. Sweaters, bathing suits, fancy knit goods, etc., are the product.

New York, Brooklyn. A charter has recently been granted at Albany to the New York Knitting Mills Co., with a capital of $25,000. The incorporators are B. A. Lehman, Smithtown, L. I.; Harry Goldman, 205 Wooster St., New York, and John H. Mayer, 771 Herkimer St., Brooklyn.

Personals

B. J. Murphy, overseer of carding at the Bound Brook Woolen Co., Bound Brook, N. J., has severed his connection with that company.

Oland Comstock has accepted the position as overseer of finishing at the Roy Woolen Co., Watervliet, N. Y. He comes from Franklin, N. H.

Robert W. Boys has accepted the position as superintendent of the Killingly Mfg. Co., Killingly, Conn. He was formerly employed at the Newmarket Mfg. Co., Newmarket, N. H.

Robert C. McFadden, superintendent of the Samoset Co., Valley Falls, R. I., has accepted a similar position with the Suncook Mills, Suncook, N. H.

Thomas Leonard, overseer of the cloth department at the Samoset Co., Valley Falls, R. I., has accepted a similar position with the Suncook Mills, Suncook, N. H.

H. L. Gammage, designer at the Hockanum Mills Co., Rockville, Conn., has resigned to accept a similar position with the Rhode Island Worsted Co., Stafford Springs, Conn.

P. W. McMahon, designer at the Rhode Island Worsted Co., Stafford Springs, Conn., has severed his connection with that company.

J. C. Trimble has resigned as manager of the Lion Mfg. Co., St. Johnsville, N. Y., to accept a similar position with the Scranton Textile Co., Scranton, Pa.

Frank Strickland has accepted the position as overseer of combing at the Passaic Worsted Spinning Co., Passaic, N. J.

W. R. Shanks, superintendent of the Yantic Woolen Co., Yantic, Conn., has severed his connection with that company.

Walter W. Shuttleworth, treasurer and secretary of the Shuttleworth Bros. Co., carpet manufacturers of Amsterdam, N. Y., has sold his interest in the company and will retire from active business.

Fred Langlon has accepted the position as second hand of the card room with S. Slater & Sons, Webster, Mass.

William Casey has accepted the position as second hand in the finishing room at the S. Slater & Sons Mill, Webster, Mass. He comes from North Billerica, Mass.

Michael Degnan has accepted the position as overseer of spinning at the Edward T. Steel & Co.'s Mill, Bristol, Pa.

G. C. Meredith has accepted a position as overseer of the cloth room at the Gaffney Mfg. Co., Gaffney, S. C. He was for a number of years overseer of the cloth room at Seneca, Newry and the Gluck Mills, at Anderson, S. C., but recently second hand in the cloth room at the Spartan Mills, Spartanburg, S. C.

George Pokorny, formerly overseer of the cloth room at the Royal Bag & Yarn Mills, Charleston, S. C., has accepted a similar position at the Carolina Mills, Greenville, S. C.

John Price, overseer of carding at the Peck Mfg. Co., Warrenton, N. C., has resigned and is now employed at Emporia, Va.

H. C. Moore has accepted the position as superintendent of the Entwistle Mill, Rockingham, N. C. For the past seven years he has been with the Laurinburg Mills, of Laurinburg, N. C.

W. L. Mitchell, formerly of Huntsville, Ala., has accepted the position as overseer of weaving nights for the Brookford Mill, Hickory, N. C.

S. C. Simmons has been appointed superintendent at the Pioneer Cotton Mills, Guthrie, Okla. He was formerly assistant superintendent at the Lanett Mills, Lanett, Ala.

J. L. Coon, overseer of carding and spinning at the Montala Mills, Montgomery, Ala., has resigned to accept a position with the Opelika Cotton Mills, Opelika, Ala., as overseer of carding.

M. C. Duncan has accepted the position as overseer of carding at the Century Mills, South Boston, Va. He comes from Rock Hill, S. C.

George W. Johnson, overseer of carding at the Hamburger Mills, Columbus, Ga., has resigned to accept a similar position with the Paragon Mills, Cedartown, Ga.

E. E. Grant has accepted the position as overseer of weaving at the Merchants Mfg. Co., Fall River, Mass. He was formerly employed at the Social Mill, Manville Co., Woonsocket, R. I.

J. C. Brinker, overseer of carding and spinning at the Fergus Falls Woolen Mills Co., Fergus Falls, Minn., has severed his connection with that company. He is succeeded by Louis Swope of Dresden, Ohio.

Max Job, overseer of dyeing at the Rockville Worsted Co., Rockville, Conn., has severed his connection with that company.

Thomas E. Ainley has accepted the position as overseer of carding at the Louisville Woolen Mill, Louisville, Ky.

John C. Wood, overseer of spinning at the Taylor & Bell Woolen Mill, Quinapoxet, Mass., has resigned.

W. P. Williamson has accepted the position as overseer of finishing and shipping at the Holt-Granite Mfg. Co., Haw River, N. C.

F. H. Doyle, designer for the Mayo Woolen Co., Millbury, Mass., has severed his connection with that company. His successor is John W. Forden, late superintendent of E. Kenyon & Son, Kenyon, R. I.

Merton Berry has accepted a position as over-

seer of carding at the Mayo Woolen Co., Foxcroft, Me. He comes from Enfield, N. H.

Geo. Taylor, overseer of spinning at the Great Falls Woolen Co., Somersworth, N. H., has severed his connection with that company to accept a similar position at Rochester, N. H.

Leonce Morin, overseer of the spinning department at the Westville Mfg. Co., Taunton, Mass., has severed his connection with that company.

Jno. E. Burt, overseer of carding at the Hartford Carpet Corporation, Thompsonville, Conn., has severed his connection with that company.

John Marshall, superintendent of the Sawyer, Regan Co., Dalton, Mass., has accepted a similar position with the Yantic Woolen Co., Yantic, Conn.

Samuel Moore, for the past twelve years superintendent of Erben Harding Co., Tacony and Fairmount Worsted Mills, Philadelphia, Pa., has severed his connection with that company. He is succeeded by Geo. K. Erben.

J. P. Keough has accepted the position as superintendent of the Franklin Felt Mills, which was recently taken over by the American Felt Co., Franklin, Mass. He comes from City Mills, Mass.

Samuel Antcliffe has accepted the position as overseer of dyeing at the Yorkshire Worsted Mills, Lenni Mills, Pa. He was formerly employed for Edward T. Steel & Co., Bristol, Pa.

Jno. D. Pitley has accepted the position as overseer of weaving at the Livingston Worsted Co., Washington, R. I. He comes from the Beaver Brook Mills, Collinsville, Mass.

Herbert Massey has accepted the position as overseer of dyeing at the Narragansett Worsted Co., North Oxford, Mass. He comes from South Royalston, Mass.

Arthur E. Benson has accepted the position as superintendent and designer at the Beebe-Webber Co., Holyoke, Mass. He comes from Pawtucket, R. I.

John Fairgrieve has accepted the position as overseer of weaving at the Saranac Mills, American Woolen Co., Blackstone, Mass.

Seth Walton, for the past 26 years overseer of burling and sewing at the Riverside Worsted Mill, American Woolen Co., Providence, R. I., has severed his connection with that company.

A. Lees Cochrane has accepted the position as designer at the Peace Dale Mfg. Co., Peace Dale, R. I. He was formerly employed at the Bound Brook Woolen Co., Bound Brook, N. J.

James A. Metcalfe has accepted the position as overseer of weaving and designing at the Edwards Mfg. Co., Augusta, Me.

Jos. A. Carter has accepted the position as overseer of finishing at the Uxbridge Worsted Co., Uxbridge, Mass. He was formerly employed at the Waucantuck Mills, same place.

Wm. J. Rollinson has accepted the position as overseer of finishing at the Waucantuck Mills, Uxbridge, Mass. He was formerly employed at the Uxbridge Worsted Co., previous to accepting this position.

Henry Roehm has entered the employ of the Cyril Johnson Woolen Co., Stafford Springs, Conn. This mill was recently taken over by Alexander Mitchell. Mr. Roehm formerly worked as overseer of weaving at the Warren Woolen Co., Stafford Springs, for a great many years.

Charles Cummings, overseer of weaving at the Saranac Mills, American Woolen Co., Blackstone, Mass., has severed his connection with that company.

James A. Taylor has accepted the position as overseer of finishing at the Louisville Woolen Mill, Louisville, Ky. He was formerly employed at the Martinsburg Worsted & Cassimere Co., Martinsburg, W. Va.

E. F. Brumley has been promoted from weave room No. 2 to overseer of weaving in Mill No. 1 of the Camperdown Mills, Greenville, S. C.

E. E. Smith, who has been for the past year overseer of spinning at the Chadwick-Hoskins Mill No. 2, Charlotte, N. C., has been appointed superintendent of the Marlboro Mill No. 4, McColl, S. C.

S. M. Moreland has accepted the position as overseer of carding and spinning at the Katrine Mill, Greenville, S. C. He comes from Spartanburg, S. C.

J. W. Roberts, formerly of the Vardry Cotton Mills, Greenville, S. C., has been appointed superintendent of the Katrine Mills, formerly the Fork Shoals Mill, Greenville.

E. S. Summer has been appointed superintendent of the Mollohon Mills, Newberry, S. C., having resigned a similar one at the Pioneer Mills, Guthrie, Okla.

Allen Jones, Jr., for some time with the Valley Falls Mills, near Spartanburg, S. C., has been appointed superintendent of the Palmetto Mills, Columbia, S. C., this position having been made vacant by the death of G. H. Miller.

G. T. Barger has accepted the position of night overseer of spinning at the Ivey Mill, Hickory, N. C.

Wm. McDonald has accepted the position as superintendent of the Standard Spinning Co., Oswego, N. Y., succeeding Stephen D. Bennett. Mr. McDonald comes from Bath, N. Y.

James McNicholas has accepted the position as overseer of ring spinning at the Waypoyset Mfg. Co., Central Falls, R. I.

Wm. S. Nason has accepted the position as overseer of finishing for the Dexter, Richards & Sons Co., Newport, N. H. He comes from North Billerica, Mass.

Albert E. Riley has accepted the position as overseer of dyeing at the Rockville Worsted Co., Rockville, Conn., succeeding Max Job Mr. Riley comes from Providence, R. I.

S. A. Wing, overseer of weaving at the Bernon Mill, Georgiaville, R. I., has severed his connection with that company. He is succeeded by W. M. Grove, late superintendent of the Clinton Mill, Woonsocket, R. I.

H. Gaunt, manager of the Urbana Mills Co., Urbana, O., has severed his connection with that company.

John C. Lange, Jr., has accepted the position as superintendent of the Northland Knitting Co., Minneapolis, Minn. He comes from Winnipeg, Manitoba, Canada.
R. I.

Benjamin T. Delafield, formerly connected with the Lunkenheimer Company, has become connected with the Best Mfg. Company of Pittsburg, Pa., to handle their line of valves, fittings, flanges, pipe bends, fabricated pipe and other power plant material in the St. Louis and Kansas City territory. He will make his headquarters in Kansas City.

Ulick Burke has accepted the position as overseer of dyeing at the Dexter, Richards & Sons Co., Newport, N. H. He comes from Carolina.

Jacob Auel has accepted the position as superintendent of the Millville Woolen Co., Chambersburg, Pa., succeeding Max Wagner.

E. W. Hitchcock will hereafter pay special attention to the textile sales of the Corn Products Refining Co., New York, having been assigned to the work formerly in charge of J. W. Lindau, who has recently severed his connection with the company. Mr. Hitchcock is well known to the textile trade and has been a frequent attendant at the cotton manufacturers' conventions.

Gana Dunn, who for a number of years has held the position of chief engineer and first vice-president of the Crocker-Wheeler Co., Ampere, N. J., with conspicuous ability, has resigned. He leaves with the very best wishes of the company, and his many friends and associates.

Dr. William Beckers, who has been in charge of the technical department of Farbenfabriken Co., New York, for many years, has resigned his position.

H. Carroll Brooke, chemist for the Berlin Aniline Works in Philadelphia, has resigned his position to take an interest in the Nicetown Dye Works. Mr. Wall, also connected with the same concern, has severed his connection with the company to go with the same concern.

Frederick Taylor of the New England Cotton Yarn Co., New Bedford, Mass., has accepted the position as overseer of spinning at the No. 1 Mill of the same company, succeeding James Lynch, who has taken a similar position with the City Mfg. Co., of that city.

William Sykes, overseer of dyeing at the Faulkner & Colony Mfg. Co., Keene, N. H., has severed his connection with that company. Wm. J. ered his connection with that company.

William Scott has accepted the position as overseer of printing at the Garner Print Works & Bleachery, N. Y. He was formerly second hand in several mills in New Bedford, Mass.

Wm. Marshall has accepted the position as overseer of spinning at the Lincoln Woolen Co., Camden, Me. He comes from Douglas, Mass.

Wm. F. Lake has accepted the position of assistant superintendent of the Peerless Woolen Co., Rossville, Ga. He was formerly assistant designer at the Middlesex Co., Lowell, Mass.

James Lorimer has accepted the position as overseer of dyeing at the Hartford Carpet Corporation, Thompsonville, Conn. He was formerly employed at the Roxbury Carpet Co., Boston, Mass.

Fred W. Nash has accepted the position of overseer of dyeing at the Faulkner & Colony Mfg. Co., Keene, N. H. He comes from the Narragansett Worsted Co., North Oxford, Mass.

J. Miller, overseer of dyeing at the Woolen Mfg. Co., Beaver Dam, Wis., has severed his connection with that company.

Alfred Wigglesworth has accepted the position as overseer of weaving at the Berkshire Woolen & Worsted Co., Pittsfield, Mass. He comes from Norwalk, Conn.

Flavien LePine has accepted the position of second hand of the ring spinning department at the Grant Yarn Co., Fitchburg, Mass. He comes from New Bedford.

David Matteson has accepted the position as overseer of finishing at the National Finishing Co., Woonsocket, R. I. He comes from Kenyon, R. I.

James Lynch, overseer of ring spinning at the New England Cotton Yarn Co., New Bedford, Mass., has severed his connection with that company. He has accepted a similar position with the City Mfg. Co., of this city.

J. F. Hudson, overseer of winding at the Caswell Mills, Kinston, N. C., has resigned to accept a similar position with the Kinston Mills, of the same place.

C. H. Henley, formerly of Randleman, N. C., has accepted the position of overseer of weaving at the Great Falls Mfg. Co., Rockingham, N. C. He succeeds E. E. Bowen, who has accepted the position of overseer of weaving at the Steele's Mills, same place.

J. A. McFalls has been appointed assistant superintendent of the Marlboro Mill No. 1, McColl, S. C. He comes from King's Mountain, N. C.

R. P. Sweeney, superintendent of the Fairmont Mfg. Co., Fairmont, S. C., has resigned to accept the position of superintendent of the Wylie Mills, Chester, S. C.

J. K. Collier has accepted the position as overseer of spinning at the Girard Cotton Mill, Girard, Ala. He comes from Porterdale, Ga.

L. A. Fales has accepted the position as overseer of carding at the Alta Vista Cotton Mills, Alta Vista, Va. He comes from Pawtucket, R. I.

Manning Emery, Jr., has been appointed agent of the Warner Cotton Mills, Newburyport, Mass., succeeding Lewis Dexter. Mr. Emery comes from the Lowell Weaving Co. John J. Barrett has been appointed superintendent of the mill.

John Whitehead, overseer of spinning at the Franklin Mill, Franklin, N. H., has severed his connection with that company.

Charles Hacking, overseer of weaving at the Elston Worsted Co., Providence, R. I., has severed his connection with that company.

Charles Cobbett has accepted the position as overseer of carding at the Elm Mills Woolen Co., Tilton, N. H. He comes from Somersworth, N. H.

Charles B. Maxfield has accepted the position as overseer of finishing at the Columbia Hosiery Co., New Haven, Conn. He comes from Derby, Conn.

Berry Laycock, superintendent of the Franklin Mills Corporation, Franklin, Mass., has severed his connection with that company. He was presented with a solid brass satin finish desk set consisting of seven pieces, the tray of which was engraved with the following inscription, "Presented to Berry Laycock by the employes of the Franklin Mills Corporation, August 26, 1911." The presentation was made by Edward Pickles.

Charles H. Wilson, for a number of years pay master at the Hartford Carpet Corporation, Thompsonville, Conn., has been appointed assistant superintendent of the same concern.

Thomas Conway, assistant foreman in the finishing department at the Sidney, Blumenthal & Co.'s Mill No. 1, Shelton, Conn., has severed his connection with that company.

Richard G. Riley, superintendent of the Gosnold Mill, New Bedford, Mass., has accepted a position as superintendent of the King Philip Mill, Fall River, Mass. His successor at the Gosnold Mill is John Whittaker, formerly overseer of weaving at that mill. Mr. Riley succeeds P. A. Mathewson at the King Philip Mill.

David G. Brown has accepted a position as weigher in the drug room at the Sidney Blumenthal & Co.'s Mill No. 1, Shelton, Conn. He was employed at one time at the Wassookeag Woolen Co., Dexter, Me., and later with the Knight Woolen Co., of Provo, Utah.

W. F. Warner, superintendent of the Imperial Textile Co., Utica, N. Y., has severed his connection with that company.

John J. Shea has accepted the position as overseer of carding at the Assawaga Co., Dayville, Conn. He comes from Derby, Conn.

Miss Madge Holmes, overseer of the cloth department at the Franklin Mills Corporation, Franklin, Mass., has severed her connection with that company.

Stanlisas Rainville, for the past five years overseer of weaving at the Royal Mill, has been appointed overseer of weaving at the Valley Queen Mill, River Point, R. I., to succeed Cornelius Donahue.

Cornelius Donahue and George Davis, overseers at the Valley Queen Mills, River Point, R. I., as weaver and mule spinner respectively, finished their duties there August 26th. Mr. Donahue, overseer of weaving, was presented with a handsome plush case containing a diamond scarf pin, cuff links and a tie clasp.

George Irons, late boss weaver at the Linn Woolen Co., Hartland, Me., has accepted a position as overseer of weaving at the Sawyer, Regan Co., Dalton, Mass.

M. H. Shea has severed his connection with the Sawyer, Regan Co., Dalton, Mass., as overseer of weaving. He is to accept a position as superintendent of the Langewald Worsted Mill, Monson, Mass.

L. G. Drummond has accepted a position as overseer of finishing at the Winchester Woolen Mills, Winchester, Va.

E. D. Starr has accepted a position as overseer of mule spinning at the Newmarket Mfg. Co., Newmarket, N. H.

Allan Moors, formerly overseer of finishing at Winchester, Va., has accepted a position as overseer of finishing at the Crawford Woolen Co., Martinsburg, West Virginia.

George Barraclough has accepted a position as superintendent of the Richelieu Woolen Mill, Chambly Canton, P. Q., Canada. He was formerly employed as designer at the Minterburn Mill, Rockville, Conn.

Wm. Gannen has accepted a position as overseer of weaving at John E. Owen & Son's mill at Jefferson, Wis.

Thomas Hart, overseer of dressing at the Yantic Woolen Co., Yantic, Conn., has severed his connection with that company.

Albert Williams, overseer of weaving at the Berkshire Woolen & Worsted Co., Pittsfield, Mass., has severed his connection with that company. He was presented with a watch chain with an Elk's fob and an umbrella by the help in the weaving department.

E. Allen Crowell has accepted the position as second hand in the dye house for the Faulkner & Colony Co., Keene, N. H. He comes from Madison, Me.

E. B. Brown has been appointed superintendent of the Klotho Mill, King's Mountain, N. C. He comes from the Ivy Mill, Hickory, N. C.

B. D. Abernathy has accepted a position as overseer of spinning at the Phoenix Mill, King's Mountain, N. C. He was formerly night overseer of carding and spinning at the Ivey Mill, Hickory, N. C.

James Peeler has accepted the position as overseer of carding and spinning at the Anna Mill, King's Mountain, N. C. He comes from the Dilling Mill, same place.

J. M. Lawhon, overseer of weaving at the Glenola Mills, Eufaula, Ala., has resigned.

J. E. Merchant has accepted the position as overseer of the cloth room at the Mollohon Mills, Newberry, S. C.

W. H. Bullard, overseer of weaving at Hope Mills, N. C., has resigned.

S. H. Jenkins, overseer of dyeing at the Texas Cotton Mill, McKinney, Tex., has resigned to accept a similar position with the Walton Mills, Monroe, Ga.

S. A. Lovelace has accepted the position as overseer of weaving, designing and slashing at the Brookford Mills, Inc., Hickory, N. C.

A. N. Vise, for many years overseer of the cloth room at the Union Cotton Mills, Union, S. C., died at his home, recently, after having been ill for some time.

P. A. Smith, overseer of spinning at the Eagle & Phenix Mills, Girard, Ala., has resigned to accept a position as overseer of spinning, spooling and warping at the Fulton Bag & Cotton Mills, Atlanta, Ga.

J. C. Smith, formerly of Charlotte, N. C., has accepted a position as overseer of weaving at Hope Mills, N. C.

J. E. Batson, overseer of carding at the Shawmut Mills, Shawmut, Ala., has resigned. Plrk Sparks, formerly of the Elm City Mills, La Grange, Ga., has succeeded him.

E. L. Hedge, superintendent of the Avalon Mills, Mayodan, N. C., has resigned to accept a similar position at the Edna Mills, Reidsville, N. C.

Charles E. Skiller, for many years superintendent of the Chicago-Kenosha Hosiery Co., Kenosha, Wis., has severed his connection with that company. He is succeeded by John H. Brine

Fred C. Werner, agent of the Indian Spring Mill, American Woolen Co., Madison, Me., has severed his connection with that company and is succeeded by James McDougall. Mr. McDougall was agent of the Royalston Mill, South Royalston, Mass.

G. Fiedler, designer at the Coronet Mill, Maple ville, R. I., has resigned to accept a position as superintendent of the Lymansville Co., Lymansville, R. I.

John Heaton, overseer of finishing at the Plainfield Woolen Co., Central Village, Conn., has severed his connection with that company.

James S. Turnbull, superintendent of the Smith Woolen Co., Pittsfield, Me., has severed his connection with that company.

John Engels, overseer of carding at the Warren Cotton Mill, Thorndike Co., West Warren, Mass., has severed his connection with that company to accept a similar position with the Falls Co., of Norwich, Conn.

Charles Stafford has accepted the position as overseer of finishing at the Lincoln Woolen Co., Camden, Me. He comes from Oakland, Me.

E. H. Boyce has accepted the position as overseer of finishing at the Plainfield Woolen Co., Central Village, Conn. He was reently employed at Farnumsville, Mass.

William H. Gough, draftsman, time-keeper and cost clerk at the Lonsdale Co., Lonsdale, R. I., has severed his connection with that company.

Harry Buttery has acepted the position of designer for S. Slater & Sons, Webster, Mass., succeeding Wendell J. Battye.

George A. Elliott has accepted the position as overseer of spinning at the Franklin Mill, Franklin, N. H. He comes from Harrisville, N. H.

J. W. Manly, superintendent of the Edna Cotton Mills, Reidsville, N. C., has resigned.

J. E. Whitesides has accepted the position as overseer of weaving at the Lydia Mill, Clinton, S. C. He comes from the Clinton Mills.

J. W. Knowles, overseer of carding at the Lanett Cotton Mills, Lanett, Ala., has resigned.

Elma Summer has been appointed superintendent of the Mollohon Mills, Newberry, S. C.

Pitt Stevenson has been appointed superintendent of the Capps Mill, Toccoa, Ga.

G. V. Anderson, overseer of weaving at the Avondale Mill, Birmingham, Ala., has resigned to take charge of the weaving at the Prattville Cotton Mills, Prattville, Ala.

Arthur W. Pitts, for the last three years overseer of carding and spinning at the Corsicana Cotton Mills, Corsicana, Texas, has resigned to accept a similar position with the Cuero Cotton Mills, Cuero, Texas.

G. P. Deal has been appointed superintendent of the Deep River Mills, Randelman, N. C. He was formerly superintendent of the Buck Creek Cotton Mills, Siluria, Ala.

M. C. Johnson has resumed his old position in charge of spinning, spooling, warping and quilling at the Pepperton Mills, Jackson, Ga. He comes from Scottdale, Ga.

O. M. Peters, who has been general manager and superintendent of the Corsicana Cotton Mills, Corsicana, Texas, has resigned to accept the position of superintendent of the Cuero Cotton Mills, Cuero, Texas.

Wm. D. Crawford, overseer of weaving at the Hamilton Woolen Company, Amesbury, Mass., has severed his connection with that company.

Fred Teal has accepted the position of assistant superintendent of the R. I. Worsted Co., Stafford Springs, Conn. He comes from South Glastonbury, Conn.

John Kiley has accepted the position as overseer of spinning at the Renfrew Mfg. Co., Adams, Mass. He was formerly employed by the Adams Bros. Mfg. Company.

Joseph Pilkington, formerly second hand in the weaving department at the Ann & Hope Mill, Lonsdale, R. I., but now foreman of the weaving department at the Edwards Mfg. Co., is to resign to accept a position as overseer of weaving at the No. 4 Mill of the Lonsdale Co., Lonsdale, R. I.

Robert W. Boys, for the past five years superintendent of the Newmarket Mfg. Co., Newmarket, N. H., severed his connection with that company on August 26th. As a token of the esteem in which he was held by the employes, a gathering was held at his home, when he was presented with a very handsome leather covered easy rocking chair, presentation being made by Fred Watson. There was also a large gathering in the vestry at the Congregational Church as a farewell reception to Mr. Boys under the auspices of the Men's Club in cooperation with the federated churches. In behalf of the Men's Club he was presented with a beautiful gold plated clock, glass front and sides, with cathedral gong as an expression of the very high regard in which Mr. Boys was held. Mr. Boys responded in an appreciative manner. Previous to coming to Newmarket, Mr. Boys was two years overseer of weaving at the West Boylston Mfg. Co., at Easthampton, Mass. It is the regret of his many friends that he is to leave Newmarket as he was very popular and will be missed a great deal.

Charles E. W. Matthews has been appointed superintendent of the Davis & Brown Mill, Uxbridge, Mass., succeeding John Scott.

Jacob Achler has been appointed overseer of carding at the Bound Brook Woolen Co., Bound Brook, N. J. He comes from the Chase Mill, American Woolen Co., Webster, Mass.

Wm. H. Hodgson has accepted the position as designer at the Hockanum Mills Co., Rockville, Conn. He was formerly employed at the Shirreff's Worsted Co., Fitchburg, Mass.

Charles Wilkinson, overseer of dyeing at the Yorkshire Worsted Mills, Lenni Mills, Pa., has severed his connection with that company.

Morris Gledhill, agent and superintendent of the Marston Worsted Co., Skowhegan, Me., has severed his connection with that company.

Alfred J. Knott, assistant overseer of the sewing and burling department at the Riverside Worsted Mills, Providence, R. I., has severed his connection with that company, having been in their employ for 27 years.

H. K. Ackart has accepted the position of boss knitter with Penman's Ltd., Almonte, Ontario, Canada.

DEATHS.

S. Newton Cutler, Jr., member of the firm of Hill & Cutler, cotton waste and wool stock dealers, Atlantic Ave., Boston, died at his home in East Somerville of apoplexy at the age of 56 years. He was a member of the Legislature of 1904 and 1905 representing the sixth Middlesex district. He is survived by a widow.

James S. Stewart, of John K. Stewart & Sons, manufacturers of knit goods at Amsterdam, N. Y., died at the age of 33 years. He is survived by a widow and one daughter.

George Howard died at the home of his son, Herbert Howard, in Bound Brook, N. J. He was a retired woolen manufacturer. At one time he operated the woolen mill at Greenville, R. I., was superintendent of the Thomas Dolan Woolen Mill at Philadelphia for several years and employed at the Geneva Mill, Providence, R. I. He had retired from active business some ten years ago.

Robert Robertson Street, one of the most prominent business men of Chicago, Ill., died at the residence of Frank B. Laws of Glencoe, Ill. Death was due to a sudden attack of pneumonia. He was born in Sterling, Scotland, Jan. 8, 1850, and embarked with his parents for America while a small child, being educated in the public schools of Racine, Wis. He took up his home in Chicago in 1870 and entered the employ of Enos Brown & Co., dyestuff merchants. Six years later he established the firm of R. R. Street & Co., dyestuff and textile machinery dealers. Mr. Street was a thirty-second degree Mason, a member of the Horison Shooting Club and president of the Cumberland Gun Club.

John Hayes, senior member of John Hayes & Co., manufacturers of knit goods, Philmont, N. Y., died at his home in Philmont at the age of 82 years. He is survived by a widow, three daughters and five sons. He settled in Philmot in 1850 and after learning the machinist trade, he established the Midland Knitting Mill, which is now known as John Hayes & Co.

William Ball, one of the pioneer silk manufacturers of Paterson, N. J., died in that city, Aug. 29th, in his eighty-fifth year. He was born in Macclesfield, Eng., in 1827. After receiving an education he entered the silk business. When he was 52 years of age he came to this country and settled in Paterson. In 1894 he built what is known as the Ball Mill. He is survived by three sons: John, George and Frederick. There were but few who knew Mr. Ball intimately, as he was a man who did not associate with anyone. During his life he was generous in charity, making large contributions to hospitals and made many gifts.

Frank Chester Roberts, formerly treasurer of the Lawrence Duck Co., Lawrence, Mass., and associated with the Carver Cotton Gin Co., died at Marshfield, Mass. He was a native of Bar Harbor, Me., and was born March 18, 1858. For a number of years he made his home at Braintree, Mass. He is survived by a wife and three children.

Horace Arnold Kimball, one of the most prominent woolen manufacturers of Rhode Island, died at Belgrade Lake, Me. Mr. Kimball started in the manufacture of woolen goods at Chepatchet, R. I., some years later at Pascoag, R. I., and after the mill at Pascoag was burned, he bought the Manton Mill of Manton, R. I. He sold out his interest to the American Woolen Co. some years ago. Mr. Kimball was 72 years of age and leaves a wife, one son and a daughter.

Mill News

Those interested in receiving early and more complete investigated information of projected new mills, enlargements, improvements, fires, facts and gossip of the trade are referred to the TEXTILE ADVANCE NEWS, issued weekly by the publishers of the TEXTILE WORLD RECORD, at $15.00 per year.

COTTON.

New Mills.

*Alabama, Siluria. The Buck Creek Cotton Mills, previously reported to increase the plant to 20,000 spindles and 400 automatic looms, expect to start operations with the above equipment about October 1st. This is the plant which was formerly operated under the name of the Siluria Cotton Mill.

*Arkansas, Ozark. The project of establishing a cotton mill here seems to have been abandoned as nothing has been done regarding same.

Canada, Quebec, Granby. The Granby Elastic Web Co., Ltd., is a $50,000 corporation, of which F. E. Boivin is president, J. J. Payne, treasurer, and C. W. Churchill, vice president and manager. Twelve narrow looms are operated on elastic web and non-elastic web braid. The company uses 26s and 30s two-ply carded and combed yarns, and Mr. Churchill does the buying.

Georgia, Columbus. Efforts are being made by interests here to induce parties who are contemplating the building of a $500,000 cotton mill to locate here, and it is also statel that a Georgia company which will erect a mill of 15,000 spindles may select Columbus as the site.

*Massachusetts, Fall River. Ten of the 80 cards have been installed in the preparatory department of the new Charlton Mills, as well as four mules and 36 spinning frames. The engine has been set up and is ready to be connected, and the weaving mill is under roof.

*Massachusetts, Marlboro. The picker house of the National Wadding Co. has been put in operation, and the plant will soon be running in full, employing about sixty men.

*Massachusetts, Newburyport. A large shipment of foreign machinery is arriving for the American Textillose Co. Last February, we reported the incorporation of this concern with $1,000,000 capital, to make textile fabrics. The incorporators are identified with the same interests as the International Cotton Mills, the Warner Cotton Mills and the Boston Yarn Co., whose New England headquarters are at 53 State St., Boston.

*Massachusetts, North Adams. It is said that Morgan Butler, son of President Butler of the Hoosac Cotton Mills, who has taken up mill architecture as a profession, will have general supervision of the new construction work in the company's interest.

*North Carolina, Mayodan. The Avalon Mills, destroyed by fire in June, are reported making arrangements for the rebuilding of their plant. The company manufactured 6/30s knitting yarns on 18,120 mule spindles, selling through Philadelphia. It is said that the new plant will be a duplicate of the one burned.

*North Carolina, High Point. The new Pickett Cotton Mills have placed an order through the southern agent for a full equipment of Stafford looms.

*Pennsylvania, Reading. The Reading Towel Mfg. Co., capitalized at $15,000, have started operations in Hyde Park, a suburb of this town, where a two-story and basement brick building has been secured, and equipped with 9 looms and 1 sewing machine, manufacturing Turkish towels. Eight additional looms are to be purchased and installed. A bleachery has already been established and put in operation. Product is sold through N. I. Yerkes, 256 Church St., New York.

*South Carolina, Chesnee. Building construction for the Chesnee Mills is progressing and it is said that the mills will be ready for manufacturing Jan. 1. Four hundred looms and 20,000 spindles will be run on sheetings.

*South Carolina, Fork Shoals. B. E. Geer is president and treasurer and J. W. Roberts superintendent of the Katrine Mfg. Co., which company, as stated, has taken over the old plant of the Fork Shoals Cotton Mill. They will start about Oct. 15 to manufacture 20s single and ply warps and cotton yarns on 5,248 ring spindles, operating by steam, water and electricity. The maximum capitalization of the company is $100,000. Mail address is Fountain Inn, R. F. D. No. 3. The executive offices are at Greenville.

*Texas, San Antonio. Edward Sohle, of Charlotte, N. C., is the architect for the plant of the Olympia Cotton Mills, recently reported incorporated with a capital of $250,000 for manufacturing cotton duck. It is expected that plans for buildings and machinery will soon be made public.

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Enlargements and Improvements.

*Connecticut, Bridgeport. The new weave shed, 60 by 190 feet, one story, with sawtooth roof, reported last summer to be built for Alb. & E. Henkels, has been completed and part of it is now occupied. After the entire plant is filled with machinery, they will operate between 400 and 500 lace machines.

*Georgia, Atlanta. Contract has been awarded for the erection of the new weave shed for the Exposition Cotton Mills. This will be two stories high, 100 by 213 ft., of mill construction, with tar and gravel roof, and will cost about $20,000.

*Georgia, Barnesville. Contract has been awarded for the building of the new two-story

loom shed of the Aldora Mills, previously reported to be erected. This is to be of brick, 100 by 240 ft., and when completed and equipped will enable the company to weave the yarn production.

*Georgia, Columbus. The new additions under way for the Swift Manufacturing Co., to their dye and picker houses, will not call for any additional machinery. Buildings are being erected for purpose of allowing more space and rearranging present equipment in these two departments.

*Georgia, Rome. Contract has been let for an addition to the plant of the Anchor Duck Mills, to be of brick, three stories high, 80 by 100 feet. New cottages are to be built to house the additional help required by this increase in the plant. The company operates 14,000 ring and 4,000 twisting spindles and 174 looms in the manufacture of wide duck, rope, plow line and banding.

*Massachusetts, Bondsville. Machinery is being installed in the new 4-story brick mill, 100 by 140 ft., just completed for the Boston Duck Co. This will allow the company to greatly increase their product.

Massachusetts, Cambridge. Work has been started by the contractors, the J. M. & C. J. Buckley Co., on building for the American Net & Twine Co. at Second and Charles Sts., East Cambridge. This is to be 70 by 180 ft., two stories and basement, of brick and heavy mill construction. The building is to be completed by Feb. 1, 1912.

Massachusetts, Lawrence. The Pacific Mills have placed an order with the General Electric Co. for a 1,000 k. w., three-phase, 60-cycle, 600-volt horizontal Curtis Turbine. Over 11,000 h. p. of General Electric motors are now installed in these mills.

*Massachusetts, New Bedford. It is said that plans are being drawn and that excavation work will soon be commenced for a new weave shed, one story with saw tooth roof, for the Beacon Mfg. Co., makers of napped cotton goods. This will provide for an addition of 80 new looms. The plant is reported as running night and day for the past few months. First mention of this contemplated increase was made in these columns last December.

Massachusetts, Newburyport. Orders now on hand are said to indicate good business for many months at the Warner Cotton Mills. Seventeen new cards and eight new combs are to be added to the equipment.

*Massachusetts, Springfield. The Bay State Thread Works have just completed an addition of 3 stories and basement to their plant, increasing the floor space about 40 per cent. As previously reported, this company purchased the plant of the Hartford Thread Works, which stock and machinery has been installed in the plant at Springfield.

*New Hampshire, Dover. An unofficial report states that the indications are that the Cocheco print works of the Pacific Mills, recently reported as to be removed to new quarters at Lawrence, will remain here and that the plan to remove the plant to Lawrence has been abandoned, temporarily at least, conditions at Lawrence having been found unsuitable to the making of prints of the grade which the company turns out. It is even said that additional improvements, possibly including the erection of a large new mill, are contemplated.

North Carolina, Caroleen. Two new high pressure boilers are being installed in the No. 2 Mill of the Henrietta Mills, during which time the mills will be closed.

New Hampshire, Claremont. The capital stock of the Monadnock Mills has been increased from $250,000 to $500,000, and the par value of the shares reduced from $1,000 to $100. This company was recently reported as having purchased the property of the Union Mfg. Co. at Peterboro.

*New Jersey, Rahway. The Royal Mfg. Co., whose plant was damaged by fire on May 30, are rebuilding same and expect to have it completed by the first of November. They have purchased all the necessary machinery and equipment. Plant is in operation.

North Carolina, Granite Falls. The capital stock of the Rhodhiss Mfg. Co. has been increased from $300,000 to $400,000. Domestic sheetings and heavy drills are manufactured on 15,000 spindles and 100 broad and 360 narrow looms.

North Carolina, Hildebran. The Henry River Mfg. Co. is reported as to increase its capital stock from $112,000 to $225,000. This is a cotton yarn mill operating 8,160 ring and 4,160 twisting spindles in the manufacture of peeler and Egyptian fine yarns.

*Pennsylvania, Philadelphia. The Hohlfeld Manufacturing Co., manufacturers of hammocks, lenos, cotton goods and fancy knit goods, with 10 wide and 30 narrow looms, have removed their plant from 8th and Dauphin Sts., to their new three-story brick and concrete fire proof building at 10th and Allegheny Ave,

Pennsylvania, Philadelphia. William Clarke, Inc., are installing new drying rooms in their Waverly Mills on Cedar St. above Margaret, Frankford. They manufacture table damasks, operating 140 broad looms and selling through New York.

Pennsylvania, Reading. The Hyde Park Manufacturing Co., manufacturers of cotton bats, is to be incorporated with capital stock of $45,000. This concern, which has been located in Hyde Park, a suburb of Reading, for some time back, has broken ground for the erection of a new two-story and basement brick building of fireproof construction. They will install their present equipment of 2 cards and 1 picker, which will be augmented by the purchase of a new three-cylinder garnett machine. Product is sold direct.

Rhode Island, Pawtucket. The Pawtucket Warp Co., John Fallow, manager, has moved the plant into the building formerly occupied by the Narragansett Webbing Co., on Hughes St., where the facilities will be greatly increased for making his specialties.

Rhode Island, Woonsocket. The Woonsocket mills of the Edgar K. Ray Estate, making carded cotton, are reported as running nights for some time past, except for a short time in August for the installation of new cards, by which the output was largely increased.

*South Carolina, Chester. Contract for the steel and iron work for the addition to the Wylie Mills has been awarded to the Belmont Iron Works of Philadelphia. The building is to be 300 by 100 feet, and will be used as a weave shed.

South Carolina, Greenville. It is reported that the F. W. Poe Mfg. Co. has purchased land adjoining the company's property, to be used for extensions which are contemplated. The consideration is said to be $70,000. This is a $1,000,000 corporation, manufacturing medium and fine plain cloths and fancy dobby goods on 70,000 ring spindles and 1,700 forty-inch looms.

South Carolina, Newry. It is said that the Courtenay Mfg. Co. is to install a complete electric lighting system, also a modern filter plant for the water supply of the mill and village. This is a $300,000 corporation, operating 25,536 spindles and 648 looms on print cloths.

*South Carolina, Whitmire. Reports state that the Glenn-Lowry Mfg. Co. will soon erect an addition to contain 30,000 spindles, operated by electric drive. This enlargement was provided for by the increase in the company's capital stock to $1,250,000, authority for which was recently given, as reported.

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Mills Starting Up.

Alabama, Montgomery. The Montala Mfg. Co., sheetings, shirtings and drills, after being closed the greater part of the summer, are reported as resuming operations on full time.

*Georgia, Cedartown. After a shutdown, during which general repairs were made to equipment, the Standard Cotton Mills have resumed on full time. Hosiery and underwear yarns are made, 6 to 22s, on 13,728 mule spindles.

Indiana, Evansville. There is a probability, largely dependent upon market conditions, that the Lincoln Cotton Mills Co., manufacturing sheetings, drills and light ducks on an equipment of 16,320 ring spindles and 464 looms, will resume operations this month. The plant has not been running for some time.

Massachusetts, Fall River. The Weetamoe Mills have resumed operations after a shutdown of three weeks.

North Carolina, Charlotte. The No. 3 mill of the Chadwick-Hoskins Co., fine sheetings, has resumed operations on full time after a month's idleness.

Pennsylvania, Philadelphia. The plant of the John Mawson Hair Cloth Co., which has been closed for repairs to the boilers, has resumed operations.

Pennsylvania, Philadelphia. The Colonial Mfg. Co., Boudinot St. and Allegheny Ave., fancy madras shirtings, are starting all their looms as fast as the warps can be made.

WOOLEN.

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New Mills.

*Maine, Camden. The Lincoln Woolen Co., recently reported incorporated with a capital of $10,000, Julius B. Waterbury, president, and Chas. I. Lincoln, treasurer, superintendent and buyer, has leased the Mt. Battie Mill, formerly occupied by the S. G. Hall Mfg. Co., for a period of five years. The five sets of cards and 40 looms will be operated on men's wear and cloakings, to be sold through Thos. F. Shaw & Co. of New York.

*Massachusetts, Franklin. Work is progressing rapidly on the foundations for the building for the Clark-Cutler-McDermott Co. and the framework will be started in a short time. It is expected that the building will be in shape to commence operations by the 1st of December.

*Washington, Ellensburg. At a meeting of the directors of the Washington Woolen Mills held recently, the matter of construction work was considered and it is said that work will start at once. It is expected to have the mills ready for operation early next spring. Machinery has been ordered.

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Enlargements and Improvements.

*Connecticut, Stafford Springs. Twenty Knowles looms have been purchased to replace some Crompton looms in the Cyril Johnson woolen mill, which will be operated by A. I. Mitchell, as previously reported. A new dresser is also being added.

*Indiana, La Porte. The Wallace & Smith Blanket Mills are occupying the new addition previously reported to be built. This contains a new dye house, finishing room, scouring plant and picker plant. They have added 10 new mules. This plant is run on bed and horse blankets and has an equipment of 10 sets cards and 55 looms.

Indiana, La Porte. The La Porte Woolen Mills, manufacturing dress goods, are reported as adding a new picker house and weave room to the plant.

Massachusetts, Lawrence. A new piece dyer of late model has recently been installed by Walworth Bros., who are reported as running their 200 broad looms to capacity on their line of dress goods and men's wear.

*Massachusetts, Lowell. Work is under way on a new dye house, 277 by 46 ft., for the Bigelow Carpet Co. As previously reported, this new plant, replacing an old one, will be known as No. 17 Mill.

Massachusetts, Oxford. It is reported that an addition is to be built to the Bernon Mill of David N. Taft, the same to be of brick, 22 by 28 feet, two stories high. Six new looms, it is said, will be installed when this is completed. A concrete flume will replace the wooden one which has been in use since the mill has been in operation.

Massachusetts, Warren. The Bradford Yarn Mills, who have been dependent for power upon the Quaboag River, have installed a gasolene engine for use when the water supply is short.

New Hampshire, Dover. The Sawyer Mills of the American Woolen Co. have installed the Tillotson system of humidifiers in the carding and spinning departments.

New Hampshire, Tilton. The Tilton Mills have started work on an addition of brick and concrete construction, three stories high and 80 feet in length, the first floor of which will be used as a dye house and the second story for the drying room, etc. A 300 h. p. steam plant is also being installed. The company is reported as busy and running day and night.

*New York, Albany. The new 3-story addition reported to be built last spring for F. C. Huyck & Sons, has been completed and duly equipped.

*New York, Amsterdam. Although McCleary, Wallin & Crouse have purchased the mill formerly operated by Mitchell Bros. for purpose of erecting a power plant, they advise that the new plant will not be built for a year or two.

New York, Watervliet. The mill of Roy Woolen Co. is closed for repairs, and the output will be increased by the installation of new machinery. The company makes carriage cloths and dress goods, and operates 6 sets of cards and 30 looms, dyeing and finishing.

Pennsylvania, Philadelphia. R. M. Smith, operating 14 broad looms on worsted fabrics, men's wear, has removed his plant to the Megowan Mills at Adams and Church Sts., Frankford. Product is sold direct.

Pennsylvania, Philadelphia. The Windsor Manufacturing Co., 4060 Orchard St., Frankford, manufacturers of fine worsted men's wear and dress goods, are reported as about to increase their plant by the installation of additional looms. The present equipment consists of 21 looms.

Pennsylvania, Philadelphia. The John B. Stetson Co., manufacturers of felt hats, the largest concern of its kind in the country, has recently purchased the block of ground extending from 3d to 4th St. and from Montgomery Ave. to Berks St., and opposite their present buildings. On this ground they will erect an eight-story warehouse, 50 by 200 ft. Other buildings will be erected on the remaining space at a later date.

Rhode Island, Greystone. The mill of Joseph Benn & Sons, Inc., at this place is very busy, running full time. They are putting up a large building, to cost upwards of $50,000, for a cooperative store, post office and other purposes.

*Rhode Island, Wickford. The Premier Worsted Mills are reported busy on heavyweight duplicates and lightweight samples. The Clear River mill at Pascoag which the company has leased, as previously reported, will probably be running in about six weeks. Some new finishing machinery is being installed.

Vermont, Bennington. The Holden, Leonard Co. has completed a large brick building for the pump, which will have capacity of 2,000 gallons a minute, to be used for fire purposes. This will also be used as an auxiliary to the sprinkler system. Some of the departments of this mill have been running nights on heavy weight goods.

Vermont, Winooski. Contract has been awarded for the erection of the 178-foot chimney for the Burlington Mills of the American Woolen Co.

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Mills Starting Up.

Pennsylvania, Philadelphia. The Florence Worsted Company has been started up by parties who recently purchased the equipment of the plant formerly operated by John Cotshott at 2632 Mascher St., containing 12 looms. They are manufacturing worsted dress goods and men's wear, which they are selling direct.

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Mills Shutting Down.

*California, Stockton. The Stockton Woolen Mills are now going out of business. This plant has been closed for several years.

Connecticut, Winnipauk. It is reported that the plant of the Norwalk Mills Company has been closed for an indefinite time.

*Maine, Bridgeton. The Forest Mills at this place remain closed.

Pennsylvania, Philadelphia. The Long Bros. Co., proprietors of the Quaker City Mills, 3d and Ontario Sts., reported previously as to retire from business, are offering their machinery for sale in lots as desired. The machinery includes thirty 72-inch, eighteen 64-inch, one hundred and seventeen 48-inch, fifty-seven 45-inch and forty 42-inch looms, as well as winders, spoolers and all other equipment used in the manufacture of their output of dress goods and men's wear worsteds.

KNIT.

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New Mills.

Canada, Ontario, Toronto. The Thompson Knitting Co. is operating a plant at 334-36 Clarence St., making ladies' and misses' seamless cotton hose.

Michigan, Middleville. The Blake Knitting Co., Ltd., is a new concern which will start operations about Oct. 15th, making men's guaranteed hose. Glenn E. Blake is president of the company and buyer and C. A. Robertson, treasurer. They will operate 5 knitting machines.

*New Jersey, New Brunswick. The Norfolk & New Brunswick Hosiery Co. have been remodeling their old buildings and have raised roof and put on new story on their large mill, 50 by 200 ft. This company manufactures sweater coats for men and women in addition to knit underwear for men, women and children.

ported established here to manufacture all lines of knit goods. J. W. Baker, president of the People's Bank of Frazeysburg, is among those interested in the enterprise.

Ohio, Zanesville. A new factory has been re-

*Pennsylvania, Allentown. The Royal Knitting Mills have been started up at Rittersville, a suburb of this town, by Knecht & Reed, in the manufacture of misses' union suits. The plant contains 6 knitters and 13 sewing machines. They use cotton yarns, 15s up, and sell through New York.

Pennsylvania, Philadelphia. The Bellows Knitting Company have leased a portion of the building at 134-36 Market St., in which they have installed machinery for the manufacture of knitted neckties, which they will sell direct.

Pennsylvania, Philadelphia. The Grand Hosiery Co., 2046 E. Sergeant St., J. Price, superintendent, manager and buyer, has started in the manufacture of ladies' seamless hosiery, with seven knitting machines, one looper and one welter. They use 30/2 to 50/2 and 60/1 to 70/1 yarns, also 80s on cones, finish and sell through agents and direct.

Pennsylvania, Philadelphia. A new plant for the manufacture of knitted silk neckties has been started up by the Modern Knitting Mills at 310 Carpenter St. They sell the production direct.

Pennsylvania, Philadelphia. Levy & Company, under the name of "Colonial Scarfs," are manufacturing a line of fine silk neckties at 931 Market St., where they have recently installed several knitting machines for that purpose.

Pennsylvania, Philadelphia. The International Knitting Mills have fitted up a portion of the building at 253 South 5th St. with knitting machines on which they are manufacturing a line of knitted neckties of silk. Sell product direct.

Pennsylvania, Philadelphia. Rose & Lehrfeld have installed equipment of knitting machines at 1024 Filbert St., and are manufacturing high grade silk neckties. They sell the product direct.

*Reading, Pa. The Premier Underwear Co., recently incorporated with a capital of $10,000, J. L. Coxe, president and manager, H. A. Coxe, treasurer and David Kauffman, superintendent, will commence their operations at 812 Windsor St. They will install as an initial equipment, 3 knitters and 5 sewing machines to be operated on ladies' mercerized and plain Swiss ribbed vests, to be sold direct.

*Tennessee, Maryville. Work has been started on the new mill for the Maryville Hosiery Mills, replacing the plant destroyed by fire. Plant will be equipped with 300 knitting and 20 sewing machines, dye house and steam power. Ladies' and misses' cotton hose will be made, using single, carded and combed yarns, 16s to 30s. R. B. Oliver is president and treasurer of the company, capitalized at $50,000 and C. S. Grover, superintendent. H. S. Meyer & Co., St. Joseph, Mo., will sell the product.

Wisconsin, Stoughton. The branch of the National Knitting Co. of Milwaukee is reported as running to capacity. Additional machinery is being installed, which will be put in operation as soon as help can be secured. Hosiery and gloves are the product of this branch factory, of which H. Kroetz is manager.

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Enlargements and Improvements.

*Illinois, Champaign. The Textile Manufacturing Co., manufacturing high grade underwear and hosiery, has removed the entire plant from Chicago to this place.

*Indiana, Fort Wayne. The Wayne Knitting Mills expect to occupy the new addition, 145 by 45 ft., under construction about Oct. 1. They will install 300 new knitting machines. This mill is run on cotton hosiery.

Maryland, Hagerstown J. C. Roulette & Sons, manufacturers of ladies' ribbed and full fashioned underwear, are building a brick addition to their plant, 34 by 50 ft., to be used for storage purposes.

New York, New York City. Simon Ascher & Co., 596 Broadway, manufacturers of ladies', juveniles' and infants' sweaters, shawls, infants' wear and fancy knit goods on 200 flat knitting machines and 30 sewing machines, will change their location, having leased the four upper floors at 390-392 Fourth Ave. for a long term of years.

New York, Sherburne. The Utica Knitting Co. will build an addition, 100 by 40 feet, to their branch cotton yarn mill here. Work will be completed this fall.

New York, Utica. It is reported that the Oneita Knitting Mills will make additions to their boiler house.

North Carolina, Newton. According to report, a two-story addition, 50 by 100 feet, will be erected by the Fidelity Hosiery Mills, Inc., which will be run on a higher grade of hosiery than the company's present product.

Ohio, Piqua. It is understood that contract has been let by the Piqua Hosiery Co., manufacturers of men's fleeced ribbed union suits in cotton, wool, silk and merino, for the erection of a new mill building of concrete construction, 4 stories high, 115 by 67 feet, Considerable new machinery will be added.

Pennsylvania, Lebanon. H. K. Deeds, operating 40 knitters and 5 loopers on men's and women's seamless hose and half hose of cotton, lisle, mercerized and silk, is very busy. He has in contemplation the erection of a new three-story brick building at his present location, 424 Guilford St., and has had plans prepared for same in order to go ahead with the operation as soon as ready.

Pennsylvania, Philadelphia. The Brown-Aberle Co. are reported as about to install 12 new full fashion frames to their present equipment at Palethorp and Huntingdon Sts. They manufacture full fashion hosiery in cotton, lisle and silk.

*Pennsylvania, Philadelphia. It is reported that Thos. E. Brown & Son, located at Front and Westmoreland Sts., will add 19 new full fashion frames to their present equipment. These machines will be installed in the new addition recently erected by them.

*Pennsylvania, Philadelphia. The Henry Lemuth Co., Ontario and D Sts., manufacturers of full fashioned silk hosiery, with 12 frames and 6 loopers, one of the new concerns recently started in this city, are arranging for the enlargement of their plant by the installation of 12 more full fashion machines. The present equipment is too small to handle the large amount of business they are receiving.

Pennsylvania, Philadelphia. The Reis & Smith Manufacturing Co., now at 141 N. 3d St., where they are manufacturing sweater coats, bathing suits, etc., have leased the eighth floor of the new concrete building at 12th and Race Sts.

*Pensylvania, Reading. Only one floor of the new two-story addition, 100 by 300 ft., to the plant of the Berkshire Knitting Mills will be occupied by that company. The other floor will be occupied by the Narrow Fabric Co., who will move into it a branch plant which they have been running in the center of the city.

Pennsylvania, South Bethlehem. The Chipman Knitting Mills, of Easton, have leased a portion of the skating rink, in which they have installed 20 loopers and 4 welters for the purpose of looping and welting for the main mill at Easton. F. C. Christman is in charge. It is thought that knitting machinery will also be installed later on.

Pennsylvania, South Bethlehem. The Alacrity Knitting Mills, manufacturers of silk and mercerized half hose, on 15 knitters, 4 ribbers and 4 loopers, have removed from their old location on Bishopthorpe St. to the new and just completed one-story and basement building on Cherokee St. Boilers and engines have been installed for motive power.

Pennsylvania, Philadelphia. The Harris Knitting Mills are removing their plant from 249 Collum St., Germantown, to new quarters in the Leicester & Continental Mills at Lena and Armat Sts., where more room has been secured with which to enlarge their plant and operate on a larger scale. They are now operating 50 knitters, 6 sewing machines and 3 loopers, under the management of H. R. Harris, on a line of fine knit worsted gloves, which are sold direct.

*Pennsylvania, Williamstown. We are informed by the Durbin-Mellon Hosiery Co. that the statement that they are offering their plant for sale with a view of retiring from business, is untrue, the facts being that they are selling off some of their older coarser gauge knitting machines and installing new, up-to-date fine gauge machines.

*Tennessee, Rockwood. It is said that the Rockwood Mills, hosiery manufacturers, have decided not to adopt the use of electricity, as recently proposed, but will continue with steam power. A new power plant of this kind will be built and equipped, to include a larger engine than the one now in use. The additional machinery will soon be placed in position.

*Wisconsin, Kenosha. The Chicago-Kenosha Hosiery Co., reported increasing the capital stock from $300,000 to $600,000, advises that this is simply an increase in the capital stock and that no change whatever will be made in the plant or business.

*Wisconsin, Stoughton. Fifteen new knitting machines and two sewing machines have been installed in the branch mill here of the National Knitting Co., Milwaukee. Men's, women's and children's knit gloves are made.

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Mills Shutting Down.

Pennsylvania, Palmyra. The Palmyra Knitting Mills, after a shut down of several weeks, have started up again with a fair business on their books. They are manufacturing 176-needle seamless half hose with 20 knitters, 5 ribbers, 5 loopers by steam and sell their product through agents to the jobbing trade.

SILK.

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New Mills.

*Connecticut, Willimantic. The Rossie Velvet Co. has begun operations in its branch plant, operating 15 looms and employing 25 hands at present. Additional looms will be installed, there being room for 100, with the necessary winding, warping, spooling and finishing machinery. The building measures 212 by 180 feet, with saw-tooth roof, and there is a separate boiler house. Silk velvets will be the product, the same as the company's plant at Mystic.

*New Jersey, Paterson. The Franco-American Velvet Co., 92 Washington St., reported incorporated recently with capital stock of $100,000, takes over the plant run by Rivollier & Son, 18 Arlington St. H. B. Crosby is president of the new company; E. Rivollier, treasurer; E. Rivollier, Jr., agent, and M. Ribollier, superintendent. They will make ribbon velvet and velvet novelties, operating ten looms. Sell direct.

*New Jersey, Paterson. The new plant established at 93 River St. by Platt Bros., and which has been running since July 15th, is operated on broad silks. Equipment comprises 10 looms and 40 silk spindles, and steam power. They sell product direct.

*New York, Schenectady. The branch factory of the Mohawk Silk Fabric Co. on Odell St. will be opened about Oct. 15, and C. R. Morley will be in charge of this as well as the company's main factory at Fultonville. The establishment of the branch factory at Kingston has been postponed for the present.

*Pennsylvania, Emaus. The Excelsior Silk Co. has been incorporated with a capital stock of $50,000. The incorporators are Edward A., Ernest J. and Harold W. Stansfield, Edward O. Messenger, W. J. Backenstoe and James W. Kidd. This company is reported to have purchased the Keystone Silk Mills from the estate of Paul Gumbinner, and it is said that the new mill being built for them, as previously reported, the work on which has not gone beyond the foundations, will not be completed.

FIRES.

Pennsylvania, Philadelphia. The one-story building occupied by Smith & Lyons at Dyre and Willow Sts., Frankford, in which they finished hair cloths, was recently destroyed by fire with a loss estimated at $8,000.

Pennsylvania, Philadelphia. Spontaneous combustion is supposed to be responsible for a fire which is reported as having destroyed the plant of the H. L. Munz Hosiery Company, 2707-13 N. Palethorp St. The company manufactured ladies' high grade mercerized and silk hosiery and operated 65 knitters, 6 loopers and 4 sewing machines. J. Turner, operating several looms on fine worsted fabrics, located in the building, was also damaged. The loss is estimated at about $15,000.

Pennsylvania, Philadelphia. Considerable damage was done by a fire in the ingrain carpet and rug factory of Andrew Alexander, on the fourth floor of the building at Waterloo and York Sts.

FACTS AND GOSSIP.

*California, San Diego. We learn that nothing has been done regarding the cotton mill reported projected at this place early in the spring. It was then mentioned that the California Cotton Mills at Oakland would probably be interested. The eight-hour law passed has had something to do with the project being abandoned.

*California, San Quentin. It was reported early in the spring that the State Prison at this place would probably install equipment for manufacturing woolen goods. We have learned, however, that owing to other interests being started at this prison they have not taken any steps toward installing machinery for manufacturing cotton or woolen goods.

*Colorado, Trinidad. It was reported some time ago that a woolen mill was projected for this place and that Joseph Gilbert of the Chamber of Commerce was corresponding with parties. We now learn that nothing definite has yet been done regarding the enterprise.

Connecticut, Hartford. Issiah Mintz, proprietor of the Aetna Braid Mfg. Co., has filed a voluntary petition in bankruptcy, the liabilities being estimated at $17,000, with nominal assets of $15,000. This plant was badly damaged by fire about a year ago, and repairs made soon after.

*Connecticut, New Milford. The Nichols Underwear Co., reported in the summer as contemplating manufacture of knitted goods, have decided not to take up this department for the present.

Connecticut, Putnam. The mill of the Monohansett Mfg. Co. is to be started for the purpose of running out the stock on hand, and then steps will be taken toward the dissolution of the company. The machinery will be sold and the buildings and power offered for lease. Cotton sheetings are manufactured on 5,760 ring and 7,520 mule spindles and 300 looms. The company is capitalized at $50,000, Geo. W. Holt, president, and H. J. Thayer, treasurer.

Connecticut, Stafford Springs. The Rhode Island Worsted Co. is increasing its force of weavers, and it is said that a night shift to operate 80 looms will be started.

*Delaware, Wilmington. The branch factory of the Planet Mills Mfg. Co., jute yarns, twine, cordage, etc., which was taken over by A. F. Crichton, the general manager, at the time of the discontinuance of the company's main plant at Brooklyn, as reported, is to be known as the Wilmington Mill Co. It is not known at present just what changes will be made in the plant.

*Georgia, Dalton. Sites near Stevenson, Ala., and Indian Spring, Ga., are reported as being considered for the location of the 15,000-spindle cotton mill in contemplation by those interested in the Crown Cotton Mills of this place.

Georgia, Forsyth. The trustees of the Newton-Harp Mfg. Co. are advertising the sale of the property of the company to the highest bidder on Oct. 3. This is a yarn mill of 3,360 ring and 830 twisting spindles operated by electricity. The property consists of a mill building 70 by 210 ft., boiler house 20 by 30, twelve four-room houses and ten acres of land, besides the full equipment of machinery, ready for operation. J. W. Newton and J. M. Ponder are named as trustees for the stockholders.

*Illinois, Rockford. The Rockford Mitten & Hosiery Co., reported some time ago to build a branch mill, advises us that no change has yet been made in the plant, nor have any new buildings been started.

*Indiana, Fort Wayne. The Old Fort Knitting Mills, which have been in operation about two years, are now capitalized at $141,000. This plant is run on men's, women's and children's hose, in cotton, lisle, mercerized and silk full fashioned and seamless hosiery. Willis Hattersley is president and treasurer of the company, and Charles F. Ford, general manager. This plant is equipped with 64 cylinder knitting machines, 25 looping and seaming machines and 9 full fashioned machines, dye house and run by electric power.

Maine, Augusta. The Summers Linen Co. has been reported organized with a capital stock of $100,000, to manufacture linens and other textiles. E. M. Leavitt, of Winthrop, is named as president and treasurer of the concern.

Massachusetts, Boston. The full bench of the Massachusetts Supreme Court has sustained the exceptions of the defendant in the suit of John Hetherington & Sons against the Wm. Firth Co. for damages on alleged breach of contract. In the Superior Court a verdict was found for the Hetheringtons for $59,300. That verdict is now set aside and the case will be heard again, but only on the question of damages. The court holds that under the terms of the contract, the loss of profits was not contemplated as a measure of damages for a breach of contract.

*Massachusetts, Boston. The Novelty Braid Co., 19 Lincoln St., reported during the summer as to plan eventually to operate machines in manufacture of braids, advise us that they have not yet started to make goods.

New Publications

[Any work noticed under this head can be obtained through the office of this journal.]

Dressings and Finishings for Textile Fabrics and Their Application; by F. Polleyn; translated from the German by Charles Salter; 253 pages, 5 by 8 1/2; D. Van Nostrand Co., New York. Price $3.00.

This English translation of Polleyn's work is a valuable addition to the textile literature available to manufacturers in English speaking countries. The original German work went through three editions and this translation is from the third and last edition. The ground covered by the book is indicated from the following abstract of the table of contents: The Dressing Process and Materials for Same; Stiffenings and Glazes; Adhesive Dressings; Materials for Soft Dressings; Dressings for Filling and Loading; Antiseptic Dressing Ingredients; Dyeing and Bluing Agents; Various Dressings; The Preparation of Dressing; Various Adjuncts to Dressing Preparations; Appliances for the Preparation of Dressings; Recipes for Dressings; Dressings for Linens; Yarn Dressings; Laundry Glazes; Yarn Sizing; Finishing Woolen Goods; Finishing Silk Fabrics; Waterproof Dressings; Fireproof Dressings; Special Finishing Processes; The Application of Dressing Preparations; Testing Dressings.

Yarn and Warp Sizing; by C. Kretschmar; translated from the German by Charles Salter; 178 pages, 6 by 9 1/2; D. Van Nostrand & Co., New York. Price $4.00.

This book begins with a chapter on the materials to be sized, including cotton, flax, ramie, jute and wool. Then come chapters on the following subjects: The Materials Used in Sizing; The Sized Material; The Sizing Process; Sizing Recipes for Different Effects; Combined Dyeing and Sizing; The Purchase and Testing of Sizing Ingredients. The work contains many illustrations of machines used in sizing.

The Yorkshire Textile Directory; pocket edition; 360 pages, 4 by 6 1/2; John Worrall, Ltd., Central Works, Oldham, England. Price $2.50.

This directory contains a list of the textile establishments in Yorkshire classified according to the location and also according to products. The number of spindles and looms is also given. Following the regular directory comes a classified list of textile trades giving the addresses of those firms engaged in the respective branches of the business.

The Textile Industries; by William S. Murphy, assisted by leading experts in textile technology; vol. 8, 194 pages, 6 1/2 by 10; Gresham Publishing Co., 34 Southampton St., Strand, London, England. Price per volume, $3.00.

The 8th and last volume of this work has recently been issued and the scope of this work is indicated by the following abstract from the table of contents: Finishing Processes; Textile Printing; Dyeing; The Finishing of Cotton, Linen and Silk; Finishing of Woolens and Worsteds. This is followed by a glossary of textile terms, and a list of the manufacturers, machinists and others who have supplied materials for the illustration of this work.

BUSINESS LITERATURE

Inspecting the Works of the Mesta Machine Co., West Homestead, Pa.

On June 2, 1911, members of the American Society of Mechanical Engineers visited the works of the Mesta Machine Co., West Homestead, Pa. A record of this visit has been made by the company in the form of a very attractive booklet of 32 pages showing a group photograph of the engineers and also an illustrated description of the Mesta Machine Co.'s extensive works.

Steam Turbine Centrifusal Pumps and Other Centrifugal Machinery; DeLaval Steam Turbine Company, of Trenton, N. J.

A 32-page booklet illustrating and describing briefly the several lines of machinery manufactured by this concern, including single stage turbines for driving machinery of all kinds and for rope and belt transmission; turbine-driven centrifugal pumps for water works, for general water service in industrial plants and for boiler feeding, hydraulic pressure work, etc.; velocity staged turbines without gears for direct connection to high pressure blowers, centrifugal pumps, etc.; multi-stage impulse turbines with gears for driving large direct-current generators, fans, centrifugal pumps and other moderate or low speed machinery; multi-stage impulse turbines without gears in large sizes for direct connection to high speed alternators; motor and belt driven centrifugal pumps for all services and heads; multi-stage centrifugal air compressors and DeLaval speed reduction gears for various services. Copies of this booklet will be sent upon request to those interested.

..Induction Motors; the Crocker-Wheeler Co., Ampere, N. J.

This 16-page booklet describes and illustrates features of the Crocker-Wheeler induction motors. The patented magnetic bridges which are among the advantages of these motors are fully described, and it is shown how these bridges add to the motor's operating characteristics and mechanical durability and convenience.

COLOR CARDS.

Berlin Aniline Works, New York. Guinea Black 3BX Extra.

A folder containing two samples of ladies' dress goods dyed in the piece with Guinea Black 3BX extra. This dyestuff possesses good levelling powers when dyed in a sulphuric acid bath, and yields fine bloomy logwood-like shades which do not appear reddish in artificial light.

Industrial Notes

ENLARGEMENT OF THE HEMPHILL PLANT

The new office building of the Hemphill Mfg. Co., 131 Clay St., Pawtucket, R. I., is completed, and the old office quarters have been equipped with machine tools for increased manufacturing purposes.

At a meeting of the Board of Directors it was decided to build on another addition to the main building of 104 ft., making the main building 300 ft. in length, with two stories and a basement. There is also provision to be made for a new boiler house by adding to the side of the main building 60 ft. in length and 18 ft. in width, where they will install generators for supplying power to motors to run the shop.

Owing to the popularity of the Banner machine the Hemphill Mfg. Co. have been running their plant night and day for the past two months in order to increase their output, which at the present time is from 65 to 70 machines per week. With the new addition, which will be started upon at once, the above company will have facilities for turning out from 75 to 80 machines per week. They attribute their phenomenal success in the past four years they have been building the Banner machine to the fact that they have equipped their shop with the latest and most improved methods of producing work, and they have taken great care in selecting men of superior ability in the designing and building of knitting machinery.

At the present time the Hemphill Mfg. Co. are putting their machines into the best mills and have now got very close to 6,000 machines running.

A LUNKENHEIMER BARBECUE

A feature of the 29th annual convention of the National Association of Stationary Engineers, held in Cincinnati in September was the outing and barbecue tendered to the delegates and their friends by the Lunkenheimer Company of that city, at Coney Island. The party, numbering about 3,000, left the city by boat at eight o'clock in the morning, and after an enjoyable sail down the river which occupied most of the morning, reached the Island at about noon, where the big burgoo and barbecue had been prepared, and was immediately partaken of. In the afternoon, there was a ball game, bowling matches athletic contests, with appropriate prizes for all events, dancing and other amusements, up to the time the boat left for the return trip to the city at five o'clock. The outing was enjoyed by practically every delegate in the city, and was one of the biggest picnics in the history of the resort and the most elaborate entertainment ever afforded a convention of the organization. The whole affair was under the personal direction of Mr. Lane Thompson of the Lunkenheimer Company, and is of interest as an example of what a well organized business concern can do in the line of entertainment.

THROWN SILK

The J. H. & C. K. Eagle, silk manufacturers, 454 Broome St., New York City, call attention to the thrown silk branch of their business. They produce in their throwing and dyeing plants more silk than they consume and rather than curtail production they sell the surplus to the outside trade. They can furnish thrown silk, correct in weight, of a reasonable boil off, of proper twist and reliable grade. They sell thrown silk dyed, either pure or weighted in black or colors. They state that there are a number of advantages to the buyer in obtaining silk under these conditions. There is undivided responsibility between raw silk importers, throwsters and dyers. A saving of capital, avoiding the necessity of buying raw silk, sending it to the throwster and waiting several weeks before it is ready for use. It is also unnecessary to carry large stocks of thrown silk. They also state that a more uniform dramage is obtained by reason of the large amount of silk handled. The guarantee by J. H. & C. K. Eagle covers the following items:

1. Conditioned weight plus 2 per cent.
2. Boil off guaranteed 23 per cent.
(Credit allowed for any greater boil off.)
3. Skeins evenly reeled.
4. Classification strictly Yokohoma. The buyer is entitled to know the chops of any lot of silk bought.
5. No secrecy regarding the chops.

THE LETTENEY WOOD PRESERVATIVE

The Letteney wood preservative, manufactured by the Northeastern Co., 6 Beacon St., Boston, Mass., has stood the test of 44 years, its merits having been demonstrated by the condition of the wood treated with it in 1867. In that year the timbers of the Meridian Street Bridge over the Mystic River, East Boston to Chelsea, were coated with Letteney wood preservative. In 1875 the timbers of the Malden Bridge, from Charlestown to Everett, were coated with Letteney wood preservative. This bridge was rebuilt in 1900 and the good results of the first treatment led to the use of Letteney wood preservative on the new bridge. In 1876 the Letteney wood preservative was used for coating the timbers of the Dover Street Bridge, Boston, Mass. Eighteen years later this bridge was rebuilt because of changes of grade and the timbers were in such good condition that they were used again in the new bridge, the Letteney preservative being used on the new work.

The rapid advance in the cost of lumber during the past 20 years and the certainty that this cost will not decrease in the future, leaves no doubt as to the great economy in using a preparation that will protect wood from decay. In selecting the preservative it is necessary to rely on results of many years experience, and as we have just shown the Letteney wood preservative offers buyers this advantage. Further particulars regarding the Letteney product are given in a pamphlet which can be obtained on application to the Northeastern Co.

A NEW FEATURE OF THE GANDY BELT

The Gandy Belting Company of Baltimore, sole manufacturer of the Gandy belt in the United States, have adopted a novel and original idea for distinguishing the Gandy belt from the other stitched cotton duck belts. Commencing September 1st, 1911, one edge of the Gandy belting will be painted Green, while the rest of the belt will remain Red as before, and it will continue to bear the brand "the Gandy belt" and their trade mark, "A coil of belt and a bale of cotton laid across it," printed upon the belt at intervals throughout the entire length of the roll, the same as has been the rule heretofore.

It came to the notice of the Gandy Belting Company that some unscrupulous dealers were palming off on their customers inferior belts, made in imitation of the Gandy belt. To put a stop to this, the Gandy Belting Company found it necessary to institute legal proceedings to check the fraud and at the same time to educate their customers to know their goods. These suits were instituted in the United States Circuit Courts in Chicago, Pittsburg and Cincinnati, and in all of these cases the Gandy Belting Company obtained decrees sustaining their rights and enjoining the defendants from selling or offering for sale any belt not made by them as and for the Gandy belt. The Gandy belt has always had two distinctive marks, first, the words "the Gandy belt," and second the trade mark shown herewith.

Some makers of inferior belts placed on the market stitched cotton duck belting without any brand whatever, and these belts have resulted in much fraud and substitution. So to stop this injustice the Gandy Belting Company have added another distinguishing feature to their belt that will enable those desiring or specifying the Gandy belt to see at a glance whether they are getting it or not, as one edge will be painted green, while the rest of the belt will remain Red as heretofore, and will contain their trade mark as heretofore.

The foundation of the Gandy belt is a very heavy cotton duck, woven in the duck mills of the Gandy Company . The sewing machines on which the belts are stitched are built in their own machine shop, and have features possessed by no other sewing machine in that they stitch with an imbedded stitch, making the surface of the belt smooth, and holding the plies solidly together. The belt is then treated by a secret process which renders it water, heat and steam proof. The Gandy belt is thoroughly stretched and seasoned before leaving the factory. It is uniform in width, runs straight and true, and will not slip or harden.

WOOL-NAP

Concerning the reports of increase of production of "Wool-Nap" cotton blankets by the entrance of additional mills in the field, L. H. A. Schwartz & Co., Boston, are able to confirm this by their sales of Monforts' 36-roller ball-bearing napping machines.

THE NEW MODOC FACTORY

The Modoc Company, Inc., of Fernwood, Pa., and Philadelphia, has recently erected a new factory at Fernwood, a suburb of Philadelphia. This factory is 40 by 100 feet, three stories in height and practically of fire proof construction throughout. While the factory is not a large one the 12,000 feet of floor space it covers is so arranged that it is considered one of the most up-to-date and best equipped cotton sizing factories erected to date.

THE NEW FACTORY ERECTED BY THE MODOC COMPANY.

The Modoc Company has been making sizing for several years and has adopted a popular idea in the manufacturing and marketing of this important product. Following the example of some soap manufacturers who sell only on the basis of actually guaranteed soap contents of their product, The Modoc Company states the principle of selling their sizing is that the buyer is simply buying so much tallow, cocoanut oil and other high quality oils and greases, manufactured into sizing, and sold on the basis of delivering an approximate equivalent in these staple products plus the cost of manufacture, but making no charge for their knowledge of manufacturing the crude materials into shape for the customer's use.

The rapidly increasing trade of this concern in its comparatively new field convinces them of the popularity of this principle of marketing their goods. In addition to sizing their factory is equipped in the most up-to-date manner for manufacturing high grade soap powders, making mill and other soaps and compounding oils and greases.

The William Firth Company have a large force of men at work at the Charlton Mills, Fall River, Mass., erecting their fine spinning mules of Asa Lees & Co.'s make. These mules are to spin from 70s to 200s.

A BUSY MACHINE WORKS

John Eppler's Machine Works at 629 Filbert St., Philadelphia, where they are building improved cop machinery, upright knitting looms for the millinery, dress and upholstery trimming trade and an improved machine for stretching, steaming and pressing knitted neckties, report that they are very busy on all their machines. During the past month they have received orders from the following concerns for their necktie machine, which they claim is the only one of its kind in use at the present time. Carbondale Knitting Mills, Carbondale, Pa.; Bellows Knitting Co., 134-36 Market St.; Thomas E. Brown & Son, 2d and Westmoreland Sts., Philadelphia; Levy & Co., 981 Market St.; Belmont Knitting Co., 13th and Columbia Ave., and the Royal Knitting Mills, 1427 Catharine St., Philadelphia. They have also upon the shipment of their upright knitting looms to the following concerns, the Enos-Hermos Braid Co., Front and Oxford Sts., three machines, and Largman, Oppenheim & Co., Philadelphia, five machines. For this latter machine numerous inquiries have also been received from other sections of the country.

NEW CHICAGO BRANCH OFFICE

The Goulds Mfg. Co., of Seneca Falls, N. Y., are opening a new branch house at Ohio and Franklin Sts., Chicago, to handle their business in the middle western territory, including the states of Indiana, Illinois, Michigan, Wisconsin, Minnesota and Iowa. This house will take over the entire business of the present Gould company, with the exception of their line of centrifugal pumps. The branch house will handle a new line of volute centrifugal pumps along with the rest of their line of hand lift pumps, force pumps, windmill pumps, spray pumps, both hand and power, air compressors, vacuum pumps, working heads, etc.

LOCKWOOD, GREENE & CO. OPEN CHICAGO OFFICE

Lockwood, Greene & Co., architects and engineers for industrial plants, 93 Federal St., Boston, have just established a Chicago office in the First National Bank Bldg., Chicago. This will be under the managership of Harold V. Coes, until recently mechanical engineer for the Liquid Carbonic Co.

DRYING APPARATUS

The Buffalo Forge Company is installing for the Columbia Shade Cloth Company three sets of drying apparatus. One is in their factory at Minetto, N. Y., and the other two in the factory at West Pullman, Ill. Each set consists of a 70-inch, double inlet Conoidal supply fan, a similar exhaust fan, and heaters capable of drying 24 yards of shade cloth per minute. The apparatus is to be used in connection with their Tenter machines.

THE BARRETT SPECIFICATION ROOF

The Barrett Mfg. Co., with offices in New York and all the principal cities, have recently issued in convenient form for reference, copy of the Barrett roof specification with tracings from which blue prints can be made and embodied in building specifications and plans. There are various ways of constructing gravel and slag roofs, but if the Barrett specifications are followed there is no chance for mistake or slip-shod workmanship. It embodies the best experience in the roofing industry and is designed for the benefit of architects, engineers and owners. Its record embraces a large proportion of the big buildings erected in recent years.

AMERICAN COTTON BALING

The way in which the American cotton bale with its ragged ends, its excessive tare, its loose bulk, and its water packing, due to antiquated methods in the ginneries, is marketed in this country is an old-standing complaint with spinners, and the International Federation have called for an improvement on the lines of the Egyptian bale over and over again. Mr. Harvie Jordan, an ex-president of the Cotton Planters' Association of the Southern States, who is well known to cotton spinners in both countries; General S. T. Carnes, of Memphis, and Dr. Heber Jones, representatives of the Farmers' Gin Compress and Cotton Company, are visiting Lancashire at present with a view of enlisting the active support of the spinners in an attempt to remedy the complaint. They attended a meeting of spinners at the King's Arms Hotel, Oldham, recently, and explained the objects of the company.

At present in American ginneries the lint is separated from the seed and packed loosely into large bales to a density of about 12 pounds to the cubic foot. The buyers ship these bales to the nearest recompress plant, where they are unloaded and compressed to a density of 22 1/2 pounds to the cubic foot. Three years ago, after experiments extending over twelve years, Dr. Heber Jones patented a gin compress by which the cotton can be compressed at the ginnery itself to a density of 30 pounds and baled on Egyptian lines for direct shipment to the spinner. A company formed for the purpose has been working the patent, and at the meeting Mr. Jordan read letters from the Cotton Buying Company, of Liverpool and Manchester, the Bury Cooperative Manufacturing Company, and Messrs. Barlow and Jones, who have handled some of the shipments of the new bale, attesting its great superiority over the old. Among other advantages which Mr. Jordan claimed for it is a large reduction in tare. Under the new method, he said, the tare of the bale is only 12 pounds against 30 pounds in the "recompress" bale. By the saving in freight and other advantages Mr. Jordan estimated that cotton could be landed in Liverpool from the Southern States at a cost of a halfpenny a pound as against a penny a pound under the present method, and in a far more perfect condition, too. He and his colleagues explained that the planters of the

Southern States generally were anxious to avail themselves of the new method, but that vested interests, represented by the middlemen and the "recompress" companies, by no means shared this desire. They appealed to Lancashire spinners to encourage the new method by insisting on the new style of bale and by giving the company financial backing. The names of several leading spinners who have promised such support were mentioned.

The appeal was received sympathetically and further promises of support were made, several of the local spinners who took part in the discussion expressing the opinion that, besides helping the Lancashire cotton trade, the venture, if properly supported on this side, should prove to be a profitable undertaking.—The Manchester Guardian.

THE ARABOL MFG. CO.

Manufacturers that have been using tallow as a softener have, it is stated, obtained very gratifying results with soluble softening oil made by The Arabol Mfg. Co., 100 William St., New York. They obtain a smooth finish of the warps, an easy parting of the threads in the lease rods, and a clean and bright appearance of the slasher cylinders. They will find the soluble softening oil in the same condition at all seasons, sweet, pliable and uniform, winter and summer. It is neutral and easily handled. With closely woven goods, such as corduroys, velveteens, sateens, umbrella goods, cambrics, etc., it gives especially fine results.

Meeting of the National Association of Cotton Manufacturers.

(Continued from page 118)

TESTS ON THE TRANSMITTING CAPACITIES OF DIFFERENT PULLEYS IN LEATHER BELT DRIVES

By PROF. WILL MILLER SAWDON, Sc. D., Cornell University, Ithaca, N. Y.

With present day changes and improvements in apparatus for the transmission of power, mill operators and engineers generally are awakening to a realization of the importance of more efficient and dependable belt drives. It is the purpose of the author in presenting this paper to lay before the Association the results of a series of comparative tests on different kinds of belt pulleys as conducted under his direction and with the assistance of other members of the instructing staff, on the belt testing machine in the laboratory of Sibley College at Cornell University during the past eleven months.

They are, the author believes, the most extensive and thorough tests of the kind that have yet been made. The work was undertaken at the request of the Rockwood Manufacturing Company of Indianapolis, Ind., and a large amount of credit is due them for the interest taken and assistance rendered.

The chief factors of belt transmission with which the power user is concerned are the values of the coefficient of friction and the arcs of contact which determine the driving capacity of the belt on the pulleys, and the slip (slip is here intended to include creep) between them, which determines the limitations of the drive as to use.

In order to transmit power from one pulley to another there must be a difference in the tensions set up between what we shall call the tight and the slack sides of the belt. The ability to produce this difference depends upon the nature of the two surfaces, the measure of their friction and the arc of contact. The arc of contact, however, is generally fixed by conditions imposed in the particular installation, such as diameters of pulleys, distance between centers, position of the belt, etc. That pulley is best, then, in which the measure of friction of the pulley on the belt surface is greatest and the slip least. These were the two chief factors sought in the tests.

At the beginning of the tests it was the intention to make only certain observations on cast iron pulleys operating at different belt speeds and tensions for use in comparison with data on other pulleys, which was available. As the work progressed, it was found that there was so great a variation in slip on different days and even in different hours of the same day with conditions otherwise identical, that it was concluded to cover the field, not only with the cast iron pulleys, but also to make new tests on the other pulleys of wood and paper, under the same conditions. Later it was decided to extend the scope of the work and determine the effect of cork inserts when applied to the faces of such pulleys.

The tests were all made with a single ply oak tanned leather belt, 5 inches wide by 0.224 inches thick, 1.12 square inches in cross section and 33 feet long. The pulleys were all nominally 24 inches in diameter by 8-inch face. A constant belt speed of 2,200 feet per minute or 348 revolutions per minute of the driving pulley was maintained throughout.

The tests consisted primarily of a set of observations on belt slips for a series of different initial tensions, each covering brake loads from a minimum of 20 pounds to the maximum that the belt would carry or that could be safely put on the driving motor. In each set of tests six different initial belt tensions were used, as follows: 37.5, 75, 112.5, 150, 187.5, and 225 pounds per square inch of cross section.

A careful record was kept of all observations and all the details of apparatus, manner of observation, running log, methods of computation, results and curves for each set of pulleys have been recorded in a report, a copy of which is filed with the secretary of the Association for the use of members who may wish to go further into the

details than is possible to do here. On the cast iron tests alone, which were by far the most troublesome, nearly 9,000 observations of slip were taken. Since it required not less than 100 revolutions of the driven pulley between each observation, some notion may be had of the extent of the work.

The limitations of this paper require that the author confine his attention to pointing out only the main features of the tests, a brief description of the manner of arriving at the results, and some general conclusions drawn from the same.

of the normal load. This the wood pulleys cannot be expected to have, and for such service they must be designed larger in diameter or for use with a wider belt than the normal load would demand.

The introduction of cork inserts into the faces of the pulleys has resulted in each case in a general change in the characteristic of their coefficient of friction—slip curves. The wood and cast iron pulleys tested with the cork inserts were in both cases the same as used in the plain pulley tests, the corks being inserted after the plain tests were

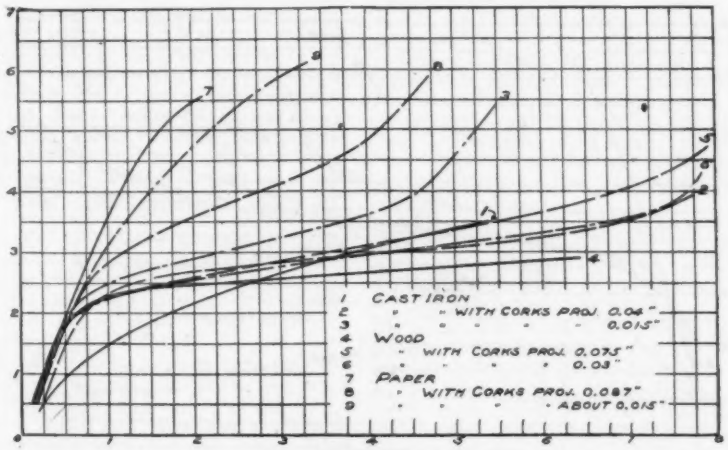

FIG. 1.

Fig. 1 shows graphically the results of the entire set of tests with reference to relative values of the coefficient of friction and belt slip for all the pulleys tested. These curves were plotted by taking values corresponding to initial belt tensions of 150 and 187.5 pounds per square inch and averaging them. This range of tensions was chosen because it approximates average practice more nearly than does any of the single tensions.

These curves show that for slips of from 1 to 2 per cent. as commonly used in practice, the plain cast iron pulley has the lowest values of coefficient of friction and the plain paper pulley has the highest. The values of the plain wood pulley lie between these limits. An interesting feature of the curve of the wood pulleys lies in the fact that up to 1/2 of 1 per cent. slip it follows very closely that of the paper pulleys, after which the slip increases rapidly and at 1 per cent. the coefficient of friction is only approximately a mean between those of the cast iron and paper pulleys. As the slip further increases, the curve becomes even flatter and beyond 3 per cent. the coefficient of friction is less than that for cast iron. Beyond 6 per cent. slip the values are the lowest of the entire set.

This condition explains in part a commonly accepted objection to the use of wood pulleys,—that is, a decidedly small capacity for carrying an overload. Many kinds of service demand, at times, overload capacities as much as 50 per cent.

made. However, in the case of the paper pulleys, additional pulleys had been made, fitted with cork inserts, and partially tested before a decision was made to include a comparison of the cork insert pulleys throughout. Both sets of paper pulleys, however, were apparently alike in all respects. The cork inserts were made under specifications for 1 1/4 inch diameter, xx straight mucilage corks as made by the Armstrong Cork Company, set in 1 1/16 inch diameter sockets and spaced 2 1/4 inches between centers and of composite construction. This gave a cork area of from 37 to 39 per cent. of the total pulley face. It is general practice to make the cork area from 25 to 33 1/3 per cent. of the total area. Two separate and complete tests were made on the cork insert pulleys, one for a projection of the corks of approximately 1/34 inch beyond the pulley face and the other for a projection of approximately 1/54 inch. This was done to study the effect of the corks as they were made to offer more or less resistance to actual contact of the belt with the pulley face proper.

In the case of the cast iron pulleys, each of the cork insert curves shows a material increase in the values of the coefficient of friction at lower slips and running up to 3 per cent. For the longer corks the values of the coefficient of friction between 1 and 6 per cent. slip are close to those of the plain wood pulleys. Below 1 per cent. slip the wood pulleys have the higher values.

With the shorter corks, considerable advantage is shown over plain cast iron pulleys as well as plain wood pulleys up to about 4 per cent. slip, after which the coefficients are but little higher than for the plain cast iron. Either of the cork insert cast iron pulleys, however, shows a large overhead capacity at high slips.

In the wood pulleys the cork inserts slightly increase the transmitting capacity for very low slips and up to about 1/2 of 1 per cent. Between 1/2 and 1 3/4 per cent. slip, the plain wood pulleys have the higher values, while beyond 2 1/2 per cent. the cork inserts again show an advantage.

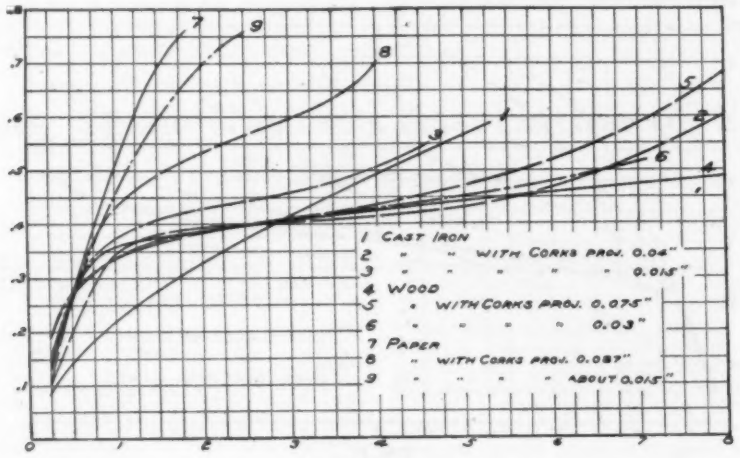

FIG. 2.

This is particularly interesting in that, though capable ultimately of carrying much greater loads. through the allowable ranges of slip, the cork inserts actually prove detrimental.

The tests on the paper pulleys with cork inserts are also interesting in that in each case the use of cork inserts has proven detrimental to the transmitting capacity of the pulleys for practically the entire range of slip. For the longer cork projection this is more marked than for the shorter Unfortunately in the paper and in the cork pulley tests, the capacity of the machine did not permit of higher loads being carried to determine the maximum values of the coefficient of friction and corresponding slips. However with the exception of the paper pulleys and paper pulleys with short corks, all the curves extend beyond the limits of practical working conditions and from their nature it seems probable that, at greater slips, the values of the coefficient of friction for the cork insert paper pulleys would approach more nearly in value those of the plain paper pulleys.

In the light of the foregoing comparisons, the conclusion may be drawn that a curve representing relative values of the coefficient of friction and slip for an all cork pulley, if such a pulley were feasible, would in the main lie somewhere between those for plain cast iron and plain paper pulleys. The effect of cork inserts in any pulley will then be dependent on whether that pulley in itself has a higher or lower relative value of the coefficient of friction than the corks. If higher, the adoption of cork inserts will be detrimental, while if lower their use will be beneficial. Furthermore, the relative effect must be dependent on the length of the cork projection beyond the pulley face, as this necessarily determines the total amount of pressure which the corks take from the face of the plain pulley before being compressed into their sockets. It is also probable that the relative areas of the corks used will have corresponding effects, although in these tests no effort has been made to determine this fact, the maximum relative cork areas only being used.

While the foregoing gives an excellent comparison of the different pulleys from an engineering standpoint, it is probable that to many members a simpler and more direct means of comparison would be in terms of slip and the horse powers actually transmitted by the belt. Fig. 2 has therefore been prepared to show diagramatically this relation. These values hold, of course, only for a belt speed of 2,200 feet per minute and an initial tension of approximately 170 pounds per square inch of belt cross section. The relative transmitting capacities of the pulleys, however, should remain much the same under other conditions of operation.

From Fig. 2 a comparison has been drawn to determine the power transmitted by the different pulleys at the various practical slips of 1, 1 1/2 and 2 per cent. This is given in the following table. Since cast iron represents the most common material used in practice, the transmitting capacity of the cast iron pulley has been taken as representing 100 per cent.

Horse power transmitted by various pulleys per 1 inch belt width—from tests.

Belt speed 2,200 feet per minute.

Initial tension approximately 170 pounds per square inch cross section.

Not corrected for arcs of contact nor maximum belt stress.

While these values represent exactly the power transmitted by the different pulleys in the tests, a comparison on this basis is not fair in that it does not take into consideration the variations in the arc of contact of the belt on the different pulleys, nor the greater stress occasioned in the tight side of the belt by the pulleys carrying the higher loads. One of the observations of the tests was that with increasing loads the arc of contact on the pulleys also increased. For some pulleys this was more marked than for others. Furthermore it is an accepted fact that the higher the working stress in the belt, the shorter is its life. A fair comparison then should be based on both these factors remaining constant. This is a difficult comparison to make directly from the tests. It can, however, be made with a large degree of fairness by using one of the formula commonly used for belt drives. A second table, No. 2, has therefore been prepared giving relative transmitting capacities of the various pulleys at different slips, when based on constant arcs of contact and constant belt tensions. These values do not represent actual observations from the tests, but were calculated by means of Nagle's formula, using an arc of contact of 180° and a maximum belt tension of 250 pounds per square inch cross section and the values of the coefficient of friction from the results as given in Fig. 1. The power capacities of the different pulleys, of course, vary between tables 1 and 2. It is certain, however, that the relative values given in table 2 are fairer and more nearly correct than those given in table 1.

[Other tables and diagrams were presented with this paper and further details of test given which may be obtained from the Secretary of the Association.]

THE EXECUTIVE MANAGEMENT OF THE TEXTILE PLANT AND ITS RELATIONS TO THE MARKET

By ARTHUR H. GULLIVER, Norristown, Pa.

There is nothing of more importance today than the control of the market for the output of cotton manufacturing. The study of its conditions, its needs and its possibilities are vital matters for the executive to insure the continuous operation of spindles and looms. Modern methods of distribution and of general information give a broader outlook and make a system necessary.

The manager at the plant who has studied the capabilities of the operatives and the machinery leaves nothing untried which will improve one, or increase the product of the other. The financial head is interested in the profits which are made in the operation of the plant, and its returns to the stockholders. The selling house outlines the policy and decides the kind and the quality of the goods to be manufactured. The buyers are only interested for the largest possible return to themselves in the distribution of the merchandise.

This separation must be removed, the executive management must keep closely in touch with the demands of the trade and the fashions. How many times either yarn or cloth is made and sold by those who have no practical acquaintance with the needs of the purchaser. Price or acquaintance secures the order and the user finds that he has purchased a material that will not meet his requirements. The dual management, operative and financial, should personally study the needs of the buyer. The quality of the yarn required for knitting and weaving and the cloth suitable for the trade should be the most important conditions of manufacturing.

When these are followed, the demand will be continuous and there will be no need to solicit trade, but repeat calls will come regularly from the satisfied purchasers.

The second gain from this personal acquaintance in the market is the anticipation of requirements. Inquiries for cloth and yarn are coming up regularly for new uses providing outlets previously unknown and for new industries, and the executive would be ready for the demands by having the material in advance. He should lead and not follow the call, whether it is a demand for an imported dress fabric or a special cloth for automobile sundries.

The continual shifting of the demands from season to season for cloth and yarn should not find the mill unprepared.

The next essential is leadership. The knowledge of the possibilities of the cotton fiber, how it can be adapted to untried uses, gives the executive the opportunity to suggest new developments for a saleable commodity to be furnished.

We have this possibility shown in the German control of the dye market which England monopolized for years. It was not what had been but what could be done. The question of cost and excellence were studied as an engineering problem. The traditional use of certain chemical processes was not regarded as final. Experimental chemistry was tried without sparing of expense or time, until the result sought was secured.

We are in the age of the destruction of national boundaries and the opening of the world's market to all the nations. These are not to be probabilities for discussion or events of a distant future, but we who are controlling the industry have them now to face. The final issue with the creative nations across the Atlantic and the imitative from the far East is the welfare for the market control. We should insist ourselves and instruct our children that price should mean quality. We have made an idol of our ability to pay high prices for any article because we had the money to expend. We have lost our sense of value entirely. Price should always mean value and never mean the cupidity of the seller or the lavishness of the buyer.

The executive heads should demand from the market the definite assurance that contracts must be carried out to the letter, not if it pleases the buyer, but as inviolate as a bond if mutually accepted. The same conditions that face the executive in the purchase, must be demanded in the sale. The market is not a separate domain with bars and bolts to keep out the executive with its own rules and customs and methods of existence. It is only one branch of manufacture as vital and

as important as the running of machinery and the purchase of the raw material.

The solution of poor distribution, limited demand, and short time operation rests with this combination of the executive and the market. Contracts are to be kept, price to mean quality, distribution of commodities to the individual to be unhampered. Excessive profit to the buyer should not be permitted in the market, but a fair division of the expense of the transportation, and a fair profit to the manufacturer as well as the dealer.

AN ACCURATE METHOD OF MEASURING COTTON STAPLE

By Dr. N. A. COBB, United States Department of Agriculture, Washington.

The accurate method of finding the average length of cotton staple to be described tonight may be illustrated in the following way: Suppose it were necessary to obtain the average length of 200 strips of crooked raw-hide. The first impulse would be to take each piece of raw-hide, straighten it out on a ruled scale, and observe and record its length. When the whole 200 has been thus treated, the lengths would be added up and the average secured by division. We could represent the facts in the case in a graphical way by straightening each piece out and arranging the 200 pieces in order so that the shortest should be at the left and the longest at the right. Thus we could get an orderly result that in certain cases might be of value. If the shortest piece were two feet long, and the longest piece four feet long, and the intermediate pieces formed a uniform series, the average would be three feet; or, again if each one of the pieces were three feet long, the average would still be three feet; and yet, considered from certain points of view, these two series, though of the same average length, would present important differences. If, for instance, it was necessary to make whip-lashes of these pieces of raw-hide and each lash must be three feet long, in the one case we could make 300 lashes and in the other only 150 lashes.

This illustration will serve to explain the method which has been devised for ascertaining and graphically illustrating the length of cotton staple. When examined under a magnifying glass, a single fiber of cotton bears a considerable resemblance to a narrow ribbon of raw-hide which has been wetted and allowed to dry in a crooked and more or less twisted condition. The cotton fibers are seen to taper gradually from butt to tip somewhat as a whip-lash does, to be twisted here and there throughout their length, and to be crooked hither and thither in a marked fashion. To ascertain the average length of a sample of cotton by the method we have under consideration, fibers are taken one by one at random, placed between two plates of glass, and then projected in an ordinary projection lantern. The projection, received on a tracing paper, appears as an image or "shadow." As the magnification is considerable, usually exactly twenty diameters, the image is twenty times as long as the fiber and bears a considerable resemblance to the picture of a river as it occurs on a large wall map.

Now there is an instrument that has been long used to measure the length of crooked lines, such as those lines on maps representing roads and rivers. There is an increased use of this instrument along with the increased use of automobiles for long trips in which it is desirable to measure off the distances which would have to be traveled by different roads. With an accurate map and a map-measure at hand it is very easy to do this. If any of you are not familiar with this instrument, here is one which will be shown to you and explained in detail. This map-measure as ordinarily used is not sufficiently accurate for the purpose of measuring the projection of cotton fibers. It has been necessary to introduce certain easily effected improvements insuring greater accuracy and speed. These improvements are embodied in the machine exhibited and can be examined by you at your leisure later on. The whole matter may be summed up by saying that with the improved map-measure it is possible to measure the length of cotton fiber so that the error falls within one two-hundredth part of an inch for the average length of staple. That is, the average length of a given sample of cotton can be ascertained by this method within one two-hundredth of an inch. Greater accuracy could be obtained, but it would hardly be advisable, as the expense would be greater than the value of the additional accuracy.

The cost of the installation for measuring staple in this way is about $100. An ordinary projection lantern is used with very trifling alterations. Such a lantern may be bought for from $50 to $75. The projections are usually viewed as transparencies on a special screen, which can be built for about $25. The running expenses are the cost of the electric light, or other light and the wages of the operator. With regard to this latter it has been found possible to secure operators at a cost of $2.00 per day. Almost any large factory will contain several operatives having sufficient manual skill to make measurements. To this manual skill must be added the most absolute fidelity. The necessary skill and fidelity can be found combined in individuals in almost any cotton manufacturing community of any size. It is therefore feasible to introduce this method of measuring cotton staple in almost any cotton manufacturing town without encountering any serious obstacles.

As to the cost of making a measurement, that varies a good deal with the sample. If the sample is a sample of combed sliver, the fiber will be sufficiently straightened and sufficiently uniform in length so that the measurements can be made with considerable rapidity than if taken from raw cotton. The number of measurements that must be taken varies very considerably according to the quality of the sample. By averaging the measurements from time to time, say at the end of every 50, and comparing the successive averages, that is to say, the average of 50, then the average of 100, then the average of 150, then the average of 200, etc., it is possible to note how the average settles down and comes to something like uniformity at

the successive fifties. Of course, one could go on measuring forever and thus obtain a more and more accurate measurement. It is simply a question of where it is best to stop. When the average settles down so that it varies or "wobbles" within the limits of one two-hundredths of an inch, it is advisable to discontinue measurements. This steadiness in the averages is sometimes obtained toward the end of the first 200 measurements, more often toward the end of the first 400. Sometimes it is necessary to go beyond this limit.

It is thus found that a sample of cotton may usually be measured and reduced to the graphical form at a cost of about $2.00. This cost is too great to permit applying the method to a single bale of cotton, but it has other applications which are so valuable that the cost of the measurement is a small matter in comparison.

In order that you may understand this method more completely than would be possible by means of any verbal description, an outfit has been installed in this building and you are invited to visit it and see the method in operation.

If you are interested in this matter, it is particularly desirable that you should appreciate the value of the graphical method of presenting the results of the various measurements. The complete result gives not only the average length of the staple but a graphical representation of the length of the various fibers, such that it is possible to draw therefrom very valuable conclusions relating to the value of the cotton and the way it will behave when it is machined.

The ideal cotton, from the spinners' point of view, is cotton in which every fiber is of the same length and otherwise well adapted for spinning. In proportion as the fiber lacks uniformity in length it falls off in spinning value. The results of this accurate system of measurement, when presented in graphical form, enable the spinner to judge of the spinning value of his cotton as never before.

As already remarked, this method of measuring the staple is too expensive at the present time to be applied to ordinary deals in cotton. One could not afford to spend two dollars in order to know accurately the length of staple in a bale of cotton under ordinary circumstances. In cases of important arbitrations, however, the method could be and, I believe, has been used.

One of the most interesting applications of this method of measuring staple consists in its application to the standard method of drawing cotton with the fingers. For the first time we now have a chance to compare our hand-drawn samples with actual fact. What cotton man would not be glad to know the exact average length of a sample of cotton which he had been sampling and of which, as a result of his hand-drawings, he had formed an estimate? If each one of us had this accurate basis to which to refer our hand-drawings, we would sooner get into greater harmony. As a begining in this direction, with the cooperation of the best experts in the United States, the Department of Agriculture has been making a study of hand-drawings of cotton. The results have been most instructive, as it has been found that on the average the best experts do not judge of the actual length of the staple nearer than 1/8 of an inch. Seventy-five to 80 per cent. of them do not get within 1/16 inch, so that its only a comparatively small fraction of recognized experts who are able to judge the exact length of the staple within 1/16 inch. I say judge. As a matter of fact, it would be better to call the operation guessing, for the results show that experts of high ability drawing several different samples vary so widely from the truth as to show their judgments in many cases, within certain limits, to be little better than guesses. It will be interesting to you to know that all of the experts tested have overestimated the length. At first this looked promising, as, if all were over-estimating an equal amount, there would at least be an harmonious error. Unfortunately, this does not prove to be the case, for, where an expert has submitted a considerable number of drawings, some of them have been nearly right and others 1/4 inch off. These studies are being continued with a view of introducing a more exact method of ordinary hand-drawing, and there can be no doubt that in the end the ordinary, quick, inexpensive hand-drawing can be materially improved by the application of this exact method of measuring the staple.

In describing the official grades before this society some years ago mention was made of the fact that it would soon be possible to issue samples of cotton of certified length. I have the pleasure to show you here today such samples. Here are samples of cotton whose average length is 1 1/8 inches, others 1 3/16 inches, 1 1/4 inches, and so on. Suppose we have on hand a cotton alleged to be of a certain length. By comparing the cotton under examination with about three drawings from the standards of that length, we can certainly arrive at a more accurate conclusion than would be possible in any other way, if reliance is to be placed entirely on drawings made by hand.

The reasons for having three different styles of any given length, say of 1 1/4 inch cotton, is that it is necessary to allow for the fact that some samples of 1 1/4 inch cotton contain more short fibers than others, the difference, of course, being made up by a certain number of exceedingly long fibers. On the other hand, a sample of 1 1/4 inch may present fibers of remarkably uniform length. The drawings from these two samples of 1 1/4 inch cotton would differ somewhat in their appearance. It would seem, therefore, desirable for the cotton man to have on hand standard samples of different styles of 1 1/4 inch for comparison with cotton submitted for purchases and alleged to be 1 1/4 inch. It is easy to imagine the time when standard samples of this sort will be common in the industry. At first they will cost several dollars per pound, but no doubt the price can be gradually reduced as the sales increase and the method of preparing them is perfected. A pound of standard cotton would furnish scores of drawings, so that the cost of any particular decision would amount to only a few cents.

It will be in order to mention some of the interesting results thus far obtained through the ap-

plication of this accurate method of measuring staple cotton.

It is commonly alleged that cotton staple is longer when damp than when dry, and it is true that it pulls longer when damp than when dry. It is not true, however, that the fiber itself varies materially in length. When the same fiber is accurately measured by this method, it is found to be of practically the same length whether wet or dry.

The reason that moist cotton pulls longer than dry cotton, especially if the atmosphere be dry, is that the fibers, which are naturally more or less crinkly, do not spring back so readily when moist as they do when dry.

It has been alleged that the fiber of cotton seed if stored for a certain length of time after picking, especially under certain climatic conditions, continues to grow. This is not true. Careful experiments have shown that the average length of a tuft of fibers taken from a seed was the same the day the boll opened that it was thirty days later after storage under good conditions. The origin of the opinion that cotton grows after it is stored, especially under climatic conditions, undoubtedly is the fact that if cotton is ginned before being properly seasoned, the staple is shorter than if it is allowed to season. It has been ascertained by experiments conducted in the Bureau of Plant Industry that the fiber of cotton increases gradually in strength from the time the boll opens. When the boll is freshly opened the cotton is, as it were, sappy. As it seasons it dries and becomes stronger, so that when it is ginned there is less breakage. Observation of these facts has led to the conclusion, which however is erroneous, that the fiber actually grows or increases in length after the boll opens and the cotton has been put into storage. As the fiber hardens it also appears to have a greater tendency to pull away at the butt, instead of breaking higher up.

Beyond question, many other interesting questions are capable of solution by the application of this accurate method of measuring cotton staple.

THE EXAMINATION AND TESTING OF CLOTH

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In dealing with a subject of this kind one must first decide upon the nature of the tests to which the cloths should be subjected, consider the means usually employed, discuss whether they are the best or the most desirable, and, if not, suggest others, and finally, the results of tests should be given, with the conclusions to be drawn from them.

NATURE OF THE TESTS

The term testing should be employed in a broad sense and made to include such items as the determination of the ends and picks per inch, the width and length, the shrinkage and regain, counts of yarns, comparison of cloths of the same nominal particulars, the strength of the cloth in various widths and lengths, tested by different machines, fixing of a ratio between the thread and cloth strengths, wearing qualities, porosity, and moisture absorbing and retaining properties.

THREADS PER INCH

It is a very common plan in the cotton trade to count the threads per one-fourth of an inch, but as the error is likely to be much greater in the one-fourth of an inch count than in the one inch count, it is always best to count the threads per one inch at least.

WILLIAM MYERS.

There are many types of instruments used for counting, all of which, however, include some kind of magnifying glass suitably mounted in a frame. In some cases the base of the frame has a square or other rectangular opening which may be one inch or any other measure; in some of the older forms the glass is mounted on a tripod and the operator uses a pointed gauge of the size required. This is a good plan as there are no shadows cast by the frame work, and the operator can move the glass over the cloth to get the best view without moving the gauge. The pointed gauge is also very useful in fabrics with high numbers of threads per inch, as a portion can be pricked off and the threads pulled out and counted. Another very good form is the traversing counting glass, Fig. 1, which is provided with a magnifying glass and a pointer mounted on a traversing screw. English measures

are carefully engraved on a bevelled plate placed immediately under the pointer, and on the other side various Continental measures are similarly engraved. Whatever kind of instrument may be used it is very important that the counting should be quite fair and accurate, that is to say, in counting a cloth, the thread and space should be included, otherwise the results cannot be satisfactory. In 1904 W. F. Sadler patented an appliance for examining cloth. He enclosed an incandescent light inside a box, with a ground glass top, the cloth being put on the glass and examined by light passing through.

It has been generally thought that the threads nearest the selvage are closer than those near the middle, but from observations which have been recently made it would appear not to be so.

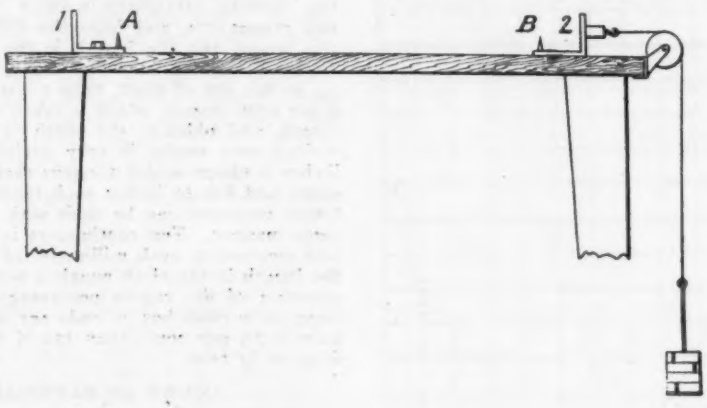

FIG. I.

WIDTH OF CLOTH

The width of the cloth is affected by the way in which it is woven, and however carefully calculations may be made to determine how many ends must be put into a certain count of reed to produce a cloth of a given width, a careless or indifferent weaver may easily upset all the calculations, by at one time weaving the warp too slack and thus letting the width go out, and at another weaving too tight and thus bending the weft more and making the cloth too narrow.

This irregular weaving also effects the number of ends per inch in the woven cloth, slack weaving will give fewer and tight weaving more per inch than normal.

In America this question of varying width has been dealt with by an agreement between three important associations representing two groups of manufacturers, and one group of merchants. The clause in the agreement dealing with the matter reads as follows:

"Width. The width shall not vary anywhere by more than three-eighths of an inch below the stipulated width nor more than five-eighths of an inch above. The width shall not be uniformly less than the stipulated width, but must, in a majority of places in each piece, be equal to or greater than the stipulated width. Goods shall be measured at right angles to the selvages, when laid upon a flat horizontal surface and smoothed out by hand, but not stretched."

The latter portion of the clause suggests how the cloth may be fairly measured, the only point of difficulty being to determine when the material is absolutely flat and not stretched. In order to have measurements made under equal conditions, it is suggested that when cloths are being measured in cases of dispute, that each sample shall have enough tension put on it to make it quite straight and flat, and that every sample shall be subjected to the same tension and under the same conditions.

An apparatus constructed on the lines shown in Fig. 1 would probably fulfil the conditions laid down.

An angular plate 1 is screwed to the table; and another similar plate is mounted on a carriage sliding in a slot in the table, and from which a weighted stalk is suspended. A series of fine steel pins, A, serve to hold the cloth in position, the vertical portion of the plate keeping it square, the other selvage is pressed on the pins, B, and placed square against the vertical pins, 2, weight sufficient to straighten the cloth is now hung on the stalk, and the distance from 1 to 2 is measured. Light weights may be used for light cloths and heavier weights for heavier cloths.

LENGTH OF CLOTH

The usual methods of measuring the length of cloth are by hooking and plaiting, the latter plan being now the most common. The older forms of plaiting machines laid the cloth in plaits forming the arc of a circle, but in the more modern machines a horizontal or concave motion is given to the plaiter, and the plaits are laid either quite flat or concave. Any size of plait can be measured according to the requirements of the customer or the market. In order to test the accuracy of the plaiting, a measure is laid into the plaits and the exact size is thus obtained. Tension is put on the cloth as it passes to the plaiter, and Lester suggests a special tensioning device, but it would not appear that it is possible to materially alter the

length of a piece by putting tension on it during plaiting, particularly if the piece is allowed to stand for a little while before the yard stick is put into the plaits.

SHRINKAGE AND REGAIN

It is very desirable in the examination or testing of a piece of cloth that the percentages of uptake of the warp and weft which have taken place during weaving should be recorded, as upon a correct estimate of these the reed to be used and the

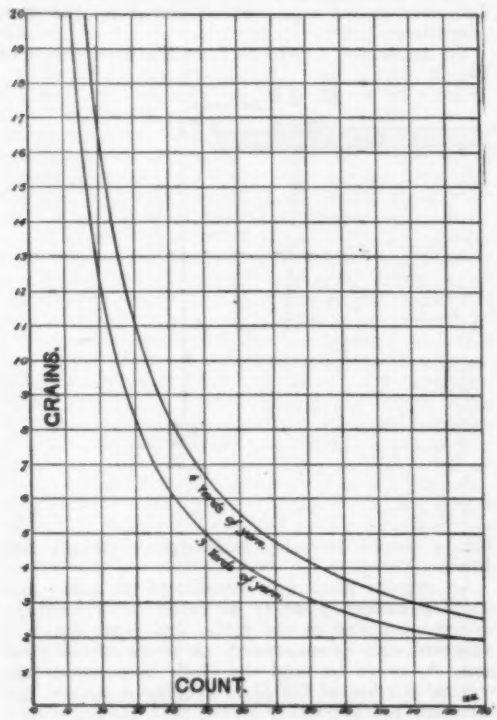

FIG. 2.

warp length are based. They are also important items in the quantities calculations. The number of ends per inch may vary to some slight extent at different places in the width of the cloth and in different pieces woven to the same particulars, but if the regain is correctly estimated, the calculated reed to be used will be the same, unless a special reed has been used in weaving the cloth. These reeds are sometimes made a little coarser for three or four inches near each selvage, but it does not appear that the gain is worth the trouble.

The two terms shrinkage and regain are often used synonmously, but the correct definition of shrinkage is the amount of loss in width or length due to the interlacing of the threads of warp and weft. Thus if a warp which stands 30 inches in the reed becomes 28.5 inches of cloth on the table it has shrunk 5 per cent., because 1 1/2 inches, the difference, = 5 per cent. of 30 inches. The term regain has reference to the amount to be added to the cloth width to give the reed width, thus taking a cloth 28.5 inches on the table the regain necessary to give 30 inches of yarn, the reed width would be 30 — 28.5 = 1.5 inches and 1.5 ÷ 28.5 = 1/19, thus 1/19 of 28.5 inches must be added to 28.5 inches to give the requisite reed width. This equals about 5.26 per cent. The explanation of this is that if the shrinkage is 5 per cent. or 5/100 the regain will be 5/95 or 1/19.

The following method of ascertaining the regain is used by a number of cloth analysts. Correctly measure off a convenient length, say 5 or 10 inches, and cut the cloth at the marks, take out a few threads, straighten without stretching them and re-measure, and from the difference between this length and the length in the cloth, calculate regain percentage thus: assume 5 inches in cloth, 5.4 inches out of cloth, then 5 : 0.4 = 100 : 8. = 8 per cent. regain, which is taken off the width or length, and added to the width or length. A rule divided into tenths is very useful when 5 or 10 inches is taken, as for 5 inches each tenth = 2 per cent., and for 10 inches each tenth = 1 per cent. Other measures can be dealt with in precisely the same manner. Ten centimeters is a very convenient measure as each millimeter of extension from the length in the cloth equals 1 per cent. The application of the regain percentage is as follows: Suppose a cloth has 72 ends per inch and the regain is 7.5 per cent., then (72 × 100) ÷ 107.5 = 66.95 or 67 reed.

COUNT OF MATERIALS

This is a most important matter, as a variation from standard or stipulated count is the cause of many disputes between manufacturers and merchants. It has already been shown in a former paper read before this Association that the count of yarn as tested in fairly large quantities differs very materially, so that when only a small quantity is available still greater differences may be expected, hence the difficulty of stating the count with a desirable degree of accuracy. The following table shows the variations which were observed when lengths of four yards of yarn were weighed:

Warp.		Weft.
28.49		24.69
28.73		24.69
28.49	Lowest	22.98
27.77		22.98
28.49		25.44
26.88	Lowest	25.83
28.73		25.25
28.73	Highest	Highest 27.32

As regards the apparatus to be used, it is quite certain that the chemical balance is best for weighing, and it should be sensitive to 0.01 grain. Two methods may be employed, first by fixing a weight unit, say 1, 2 or 5 grains, and then calculating the proper length unit for each of these, thus:

Three templates are cut to the lengths calculated in the following manner:

Calculations for Sizes of Templates.

1 grain (840 × 36) ÷ 7,000 = 4.32 inches.
2 grains (840 × 36) ÷ 3,500 = 8.64 inches.
5 grains (840 × 36) ÷ 1,400 = 21.6 inches.

The threads are taken from the cloth, straightened and cut exactly to the length required, and the number of threads that balance the weight indicates the count. This is, of course, the principle upon which the count system is based, namely, length units per weight unit equals the count; it is also the principal of the Staub balance.

The second plan is to take out a given length of yarn, according to the size of sample available, weigh the material very carefully and calculate the count. Any convenient number of yards may be taken for this kind of testing, and tables and diagrams can be made to facilitate the work of calculating the count. For example, if three yards be taken as a suitable length, a table can be made showing the count of a yarn, three yards of which is a certain weight, thus, moving by 0.01 grain, the formula and table would read:

Formula for Any Length of Yarn.

(Length taken × 7,000) ÷ (840 × weights in grains) = count.

1/2 : 7,000 : : 3 : yds. per lb.

3 yards weighing 0.50 grains = 50.00 count.
3 yards weighing 0.51 grains = 49.01 count.
3 yards weighing 0.52 grains = 48.07 count.
3 yards weighing 0.53 grains = 47.17 count.
3 yards weighing 0.54 grains = 46.30 count.
3 yards weighing 0.55 grains = 45.45 count.
3 yards weighing 0.56 grains = 44.64 count.
3 yards weighing 0.57 grains = 43.86 count.
3 yards weighing 0.58 grains = 43.10 count.
3 yards weighing 0.59 grains = 42.37 count.

The accompanying graph, Fig. 5, can also be used for three and four yards, and other curves can be easily drawn for longer or shorter lengths. For measuring the threads in this case, a template one-tenth of a yard long may be used, and for three yards thirty pieces are taken, for four yards forty pieces, and so on; or, when a small sample only is available, a template one-twentieth of a yard could be used, and double the number of pieces taken. Other uses of this principle will readily suggest themselves.

COUNT OF SIZED MATERIALS

It is important that there should be some means of ascertaining the correct count of yarn from a sample, the warp of which has been sized. The following is the method commonly employed. The yarn is taken from the cloth and is first carefully weighed and the count ascertained, then it is washed with a little soap and water, rinsed in clean water, boiled in soap and water, rinsed in clean water, boiled in 1 per cent. hydrochloric acid for about 10 to 15 minutes, taken out quickly and washed in clean water until the water ceases to give the starch reaction with iodine. The material is now carefully dried and weighed, and the count calculated in the ordinary way. The second weighing will show what loss has resulted from the treatment, and this must be calculated to a percentage. Suppose, for example, that before treatment the sample weighed ten grains and the count was 10s, and after treatment it weighed five grains, the total loss would be 50 per cent.; but it is well known that along wth the size and other impurities there is carried away a certain amount of fiber for which allowance must be made. For this loss,

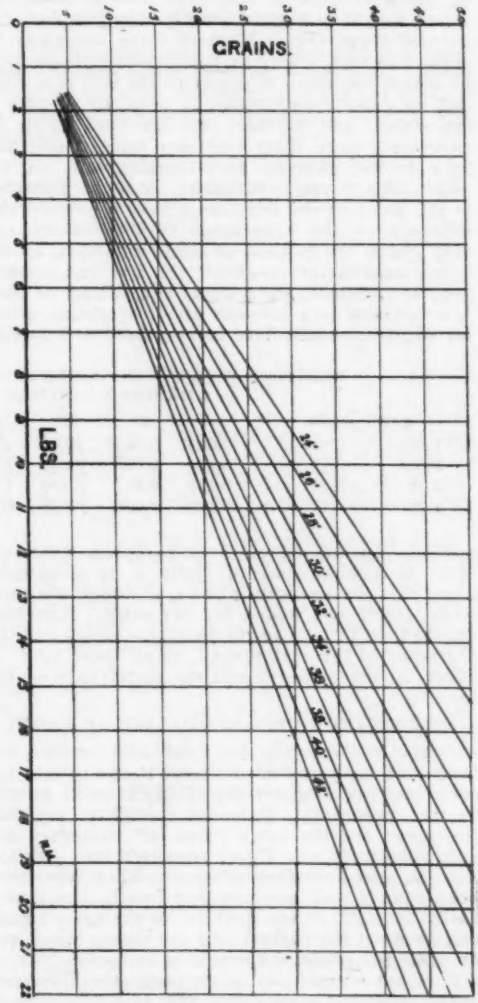

FIG. 3.

2 per cent. will be taken, so that the actual loss in size would be 48 per cent. From this the count may be calculated as follows:

1/10 — (48 ÷ 100) × 1/10 = 1/10 — 48/1.000 = (100 — 48) ÷ 1,000 = 52 ÷ 1,000 = 1 ÷ 19.23, say 19 1/4 count.

Thus the loss of fiber = 3/4 of a count approximately.

COMPARISON OF FABRICS

Comparison of fabrics of the same nominal particulars. The question is often asked, "Is the cloth delivered equal to sample?" and such a question is not always easily answered. The tests which should be applied to a fabric in this case are: width, length, ends and picks per inch, count of yarns in present and pure states, quality of yarns, weight of a given length, strength, feel, and general appearance. Most of these tests may be applied in such a way that a correct estimate may be given, but when it comes to the feel of a cloth and its general appearance, a personal element is introduced, and different opinions may easily be expressed, quite apart from any interest one may have in the matter. In colored goods, for example, this is very noticeable. A slight difference in the color or the finish may have a considerable influence on the appearance of the texture. In grey goods the method of sizing employed by different manufacturers affects the feel and appearance of a texture, and a buyer and shipper of cloth is sometimes in a dilemma about accepting goods for shipment which have to be passed in a foreign market. In making close or particular examinations or comparisons of cloth, it is sometimes found that the strength is down, although the ends, picks, count and weave are the same. Attention should then be paid to the twist, the sizing and the character of the cotton used, as all these have an effect on the strength and the appearance of the texture.

IMPORTANCE OF THE QUALITY OF YARN

Again, in comparing one cloth with another, the quality of the yarns must always be taken into account, as they so materially affect the value as well as the appearance. It is not enough to say that the yarns are the same count, or that they are both spun from, say, Egyptian cotton, the question must be asked are they of equal quality; have they been equally well prepared and spun? There may easily be eight or ten qualities of the same count, and between the highest and the lowest there will be cents per pound difference in the price.

It is not an easy matter to judge the difference in the quality of some yarns, and, as a rule, experience is the only safe guide.

MATCHING SAMPLES

In matching samples of cloth, particularly ordinary greys, the weight of the piece is of importance, because one manufacturer may get the desired result by a different proportioning of ends, picks, warp, weft, and possibly sizing, than that adopted by his competitors, but it is necessary that the ultimate result must be a piece of a given weight. When the manufacturer submits a sample, the buyer may wish to find the approximate weight of such a cloth when woven to the required width and length, or this knowledge may be required when only a small sample is available. A number of appliances are in use for getting the weight from a small sample.

In all fine weighings and testings of this character, the sample should be weighed on a good balance and the weight calculated, or ascertained from a table or diagram made for the purpose. In the method here suggested, a piece of cloth is cut carefully to a given area, an accurately measured template being used for this purpose, the sample is weighed on a good balance, and reference being made to a table or a graph, such as is shown at Fig. 3, the weight in pounds may be read off for any width 100 yards long, other lengths being proportioned to the 100. It has been thought that if the weighings are made to the nearest 0.05 grain (one-twentieth) that it will be near enough for all ordinary purposes, so that the table has this for its basis.

TABLE OF WIDTHS AND WEIGHTS

Formula: Area weighed: total area = weight: total weight. For example, assume the sample to be 2 inches square, that is, 4 square inches, and to weigh 2 grains, what is the weight of a piece, 24 inches × 100 yards?

$$4 : (24 \times 36 \times 100) :: 2 : 43{,}200 \div 7{,}000.$$

or as $(24 \times 36 \times 100 \times 2) \div (4 \times 7{,}000)$ is to 6.17 pounds.

Diagram Fig. 6 may be used instead of the tables.

TABLE OF WEIGHTS OF CLOTH 100 YARDS LONG, CALCULATED FROM SAMPLES 2 INCHES X 2 INCHES THAT IS, 4 SQUARE INCHES.

Weight of Grains	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"
1.00	3.085	3.343	3.599	3.857	4.112	4.371	4.628	4.897	5.141	5.400
2.00	6.170	6.686	7.198	7.714	8.224	8.742	9.256	9.794	10.286	10.800
2.05	6.324	6.853	7.379	7.907	8.428	8.962	9.486	10.040	10.540	11.080
2.10	6.479	7.020	7.558	8.098	8.632	9.179	9.716	10.280	10.800	11.340

STRENGTH TESTING

Considering the enormous amount of cloth which is woven, it is surprising what a small proportion of it is tested for strength, although the results of such tests might be made the basis upon which manufacturers could build new cloths. Judging, however, from the numerous inquiries we have had, of late, and the number of machines being made, it would appear as though more interest was being taken in this department of testing. For a long time past all cloth used in Government clothing factories has had to pass certain strength tests, and consequently all manufacturers engaged in this trade have had to work to these tests. Recently, a good deal of interest has been taken in the manufacture of fabrics for aeroplanes and some exceedingly fine samples of cloth have been made for this purpose, all having to pass a fairly severe strength test.

There are a number of machines on the market for testing the tensile strength of woven fabrics, and they may be divided into two groups, namely, the horizontal type and the vertical type; while

experiments are being made with machines for breaking cloth by impact, but they are only in the experimental stage at present.

COMPARISON OF CLOTH TEST WITH SINGLE THREAD TEST

It is proposed to institute a comparison between the strength of the single threads and the strength of the woven cloth made from the threads, so that a manufacturer may know what strength of yarn to use in order to obtain a certain result.

It is usual to test the strength of a sample 6 inches wide, but it is probable that better results can be obtained from narrower samples, and it is considered satisfactory in determining the strength of a cloth one meter wide, to test ten centimeters and multiply the result by ten.

Probably many more tests than are recorded here will have to be made before this point is settled with any degree of accuracy.

With a view of getting some reliable data of comparison between the yarn before weaving and the same yarn woven into the cloth, under various conditions a series of tests have been made and others are in progress, it being quite evident that a large number of tests must be made before anything of a reliable nature can be evolved.

The tests were carried out in the following manner:—Lengths of plain cloth were woven according to particular supplied, and which are given in the appended table of results; a length of yarn was then drawn down, so that the material in the condition before weaving might be tested.

Single thread tests were made of the unwoven yarn, then threads were taken from the various qualities of cloth and similarly tested, so that a comparison could be made to show the effect of weaving. Samples of cloth three inches wide were now tested and the breaks recorded, the number of ends in the width being carefully counted, and an average of the ends taken from the whole of the samples in each quality.

From the figures available in the tests the following results were obtained:

COMPARISON OF CLOTH AND SINGLE THREAD STRENGTH

Plain Cloth

Sample	Ends per Inch	Count of Warp	Picks per Inch	Count of Weft	Per Cent. of Increase
1	71.2	34	42.7	16	35 00 per cent
2	72.4	34	48.8	20	31.00 "
3	72.9	34	57.5	24	22.00 "
4	73.9	34	68.0	30	33.75 "
5	74.4	34	82.9	40	24.64 "

From these figures it would appear that qualities 1, 2, 4, show an increase of about 33 per cent., and that if more picks had been put in qualities 3 and 5 a better balancing would have given a higher break in the cloth, suggesting that there are many factors to be taken into account, besides the number of warp threads and the count, as, for example, the picks per inch, the count of weft, and the nature of the weave. A similar set of figures are obtained if the comparison is made between the cloth and the single threads before weaving.

The percentage of increase of cloth over single thread is obtained by the following formula:

(Cloth break in ounces × 100) ÷ (Ends in cloth × single thread break in cloth) — 100 = per cent. of increase of cloth over aggregate of single threads.

Thus, strength of cloth 161.35 pounds average. Ends of cloth 213.6 pounds average. Single thread break 8.954 pounds average.

Then (161.35 × 16 × 100) ÷ (213.6 × 8.954) = 135 — 100 = 35 per cent. increase.

An interesting point may be observed in connection with this series of tests, namely, the amount of shrinkage which has taken place in the width of the cloth with varying picks and counts of weft. Thus:

EFFECT OF THE COUNT OF THE WEFT AND THE PICKS PER INCH ON THE SHRINKAGE IN WIDTH

Ends in Reed	Count of Weft	Ends in Cloth	Per Cent. of Shrinkage
70	16	71.2	1.686 per cent.
70	20	72.4	3.315 "
70	24	72.9	4.078 "
70	30	73.9	5.568 "
70	40	74.4	5.989 "

WEAR TESTING

Apparatus for testing the wear resisting qualities of cloth. It is considered by many people that there is a demand for an efficient machine for testing the wearing qualities of cloth, and a number of attempts have been made to produce one for this purpose.

A short statement of the ways in which cloth is subjected to wear may help to suggest some method of dealing with the matter. Take first, outside clothing; this appears to be most subject to the rubbing of the cloth on another, and therefore if this could be imitated mechanically, perhaps that would meet the case. Second, shirts and other under-clothing; washing affects the life of these kinds of cloths as much as the actual wearing, and as this entails a good deal of rubbing back and forth, a to and fro rubbing action might be employed. In addition to this there is the effect of the elbows, and the knees, and the shoulders, and to test this, one might suggest a machine with a boring action.

[The author then described several different types of machines for this purpose.]

MOISTURE ABSORBING AND RETAINING

Fabrics composed of different fibers or treated in different ways have greater or less hygroscopic powers, and in the making of certain types of cloth it would be well to know to what extent fabrics made in certain ways attract and retain moisture, so that if possible or desirable, alterations could be made to increase or to diminish these features

In order to determine the hygroscopic properties of cloth, the cloth is first weighed, then subjected to steam from boiling water for a given period during which time shot is added in the lower pan to balance the amount of moisture taken up by the cloth. This is poured out and weighed and the cloth is dried until the first weight is balanced.

Recent Textile Patents

BOBBIN HOLDER. 1,003,026. Bernard Bartmann, Munster, Germany.

CARD PUNCHING Machine. Jacquard. 1,003,214. John G. Soderberg, Worcester, Mass.

CLOTH CUTTING Machine. 1,003,281. Hyman Maimin, New York.

CLOTH to Stentering and other Machines. Apparatus for Feeding and Guiding. 1,002,156. John Kay, Ramsbottom, Manchester, England.

COTTON GOODS. Treatment of Mercerized. 1,002,026. Friedrich E. Bottiger, Offenbach-on-the-Main, Germany.

DYE. Vat. 1,001,919. Wilhelm Bauer, Elberfeld, Germany.

DYE. Vat. 1,002,066. Arthur Luttringhaus, Lugwigshafen-on-the-Rhine, Germany.

FABRICS. Metallic Stock Shell for. 1,003,593. William F. Gammeter, Cadiz, O.

FIBROUS MATERIAL and Apparatus Therefore. Treatment of. 1,003,606. Thomas J. Hutchinson, Bury, England.

FLAX and other Fiber Yielding Plants. Machine for Treating. 1,001,925. Eugene Bosse, Salem, Ore.

KNITTED FABRIC. Transferrer for. 1,003,447. George H. Gilbert, Philadelphia, Pa.

KNITTING MACHINE. 1,003,562. Herman H. Wildt, Leicester, England.

KNITTING MACHINE. Circular. 1,003,085. William T. Barratt, Bennington, Vt.

KNITTING MACHINE. 1,003,081. Frank B. Wildman, Norristown, Pa.

KNITTED FABRIC. 1,001,629. Michel J. Fisher, Utica, N. Y.

KNITTING MACHINE. Stop Mechanism. 1,003,675. Archelas Villeneuve, Franklin, N. H.

LOOM. 1,002,122. John A. Bidwekk, Philadelphia, Pa.

LOOM. 1,003,202. George S. Pruden, Paterson, N. J.

LOOM. 1,002,163. Hamilton Lindsay, Cleveland, O.

LOOM REED. 1,002,808. Froilan C. Comellas, Mauresa, Spain.

LOOM HARNESS Mechanism. 1,003,742. George Hetherington, Philadelphia, Pa.

LOOM-GAGE. 1,003,841. Hermann W. Wilke, Stirling, N. J.

LOOM Filling-replenishing Mechanism. 1,003,528. Harry W. Smith, North Grafton, Mass.

LOOM LET-OFF Mechanism. Narrow Ware. 1,001,804. Frederick Benz, Jr., Haledon, N. J.

LOOM STOPPING Device. 1,003,209. Desiderius Schatz, Zittau, Germany.

LOOMS and Similar Machines. Wage-registering Apparatus for Mechanical. 1,002,720. Samuel Marschik, Bruen, Austria-Hungary.

MULTICOLORED Effects in Spun and Woven Goods. Process of. 1,002,118. Max Becke, Hochst-on-the-Main, Germany.

NEEDLE. Tuft Yarn. 1,003,572. Horace Wyman, Worcester, Mass.

SPINNING, Doubling and Twisting Machine. Ring. 1,001,889. Robert Riley, Burnley, England.

STOCKING WELT Former. 1,001,983. J. F. Roberts, Hartford, Conn.

SHUTTLE. 1,001,910. Edward Wackerhagen, Fort Lee, N. J.

SPINNING MACHINE Thread Breaking Device.. 1,003,104. Ferdinand Q. Hartmann, Danville, Pa.

SPOOL HOLDER. 1,001,662. Davis Marinsky, New York, N. Y.

THREADING DEVICE. 1,001,893. George T. Sampson, New Haven, Conn.

THREAD CUTTER. Float. 1,002,415. Edwin H. Marble, Worcester, Mass.

THREAD MACHINE. Wax. 1,002,217. Otis E. Brown, Brockton, Mass.

TENTERING MACHINE for Drying and Stretching Woven Fabrics. 1,003,712. Mark Day and Arthur F. Nott, Dewsbury, England.

THREAD CUTTING Tool. 1,003,922. Sanford A. Larson, Denver, Colo.

WINDING MACHINE. Gross. 1,003,301. Jean Schweiter, Horgen, Switzerland.

WOOL WASHER. 1,003,809. Frederick G. Sargent, Westford, Mass.

RECENT TEXTILE TRADE MARKS REGISTERED

"Marble." Hosiery. The Marble Hose Co., Hamilton, O.

"Pony Boy Suits." Boys' outer suits. Merit Manufacturing Co., Mayfield, Ky.

"Bankers' and Brokers'." Hosiery. Paramount Knitting Co., Chicago, Ill.

"4 B." Jute bags. Young & Metzner, Long Island City, N. Y.

"Harmony." Dress shirts. Roggen Bros. & Co., New York.

"Trio Wasit." Ladies' shirt waists. Trio Wasit Co., Philadelphia, Pa.

"Rex." Cotton dress goods. Lorraine Mfg. Co., Saylesville, R. I.

"Blossom." Cotton piece goods. Rice-Stix Dry Goods Co., St. Louis, Mo.

"Vindex." Men's overshirts. Oppenheim, Oberndorf & Co., Baltimore, Md.

"Direct." Knitted coats, jackets, vests, caps, etc. The Direct Supply Co., Martinsburg, W. Va.

"Tennis." Hosiery. George M. Lillie, New York.

"S. B." Hosiery. Skinner Bros., Chicago, Ill.

"Climax." Jute Bagging. The American Mfg. Co., Charleston, W. Va.

"Dolaristo." Neckties. Carter & Holmes, Chicago, Ill.